Intelligence, Surveillance, and Reconnaissance Operations

DRAFT—NOT FOR IMPLEMENTATION OR COMPLIANCE

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FOREWORD

Intelligence, surveillance, and reconnaissance (ISR) are aerospace power's oldest mission areas, dating back to the use of balloons to observe the adversary during the French Revolution. One of the first missions of the airplane was observation of the adversary. Just as then, today we have to take those observations, analyze their meaning and impact, and convey useful, timely intelligence on our adversaries' capabilities and intentions to our commanders.

Today the means of observing are dramatically different from the days of the "eyeball" sensor. Air surveillance radars can be mounted on low-altitude balloons to tract low-level aircraft.

Today, the means of observing are dramatically different from the days of the "eyeball" sensor. Sophisticated sensor systems provide commanders real- or near-real-time information on adversary locations, composition, and disposition. The Air Force currently operates a variety of surface-, airborne-, and space-based surveillance and reconnaissance assets that provide near global sensor coverage. Effective use of these assets enables commanders to maximize the effectiveness of their forces by optimizing our strengths, exploiting adversary weaknesses, and countering adversary strengths. Just as our means of observation have changed, we have also gained new tools to help us produce and communicate useful intelligence—computers, video teleconferences, and fax machines to name just a few. These new tools coupled with sophisticated sensors have allowed us to integrate once separate operations. The integration of intelligence and surveillance and reconnaissance now gives us the opportunity to more rapidly respond to our commander's ISR requirements and increase his range of options. **The fundamental responsibility of ISR is to provide intelligence information to decision makers at all levels of command to give them the fullest possible understanding of the adversary.**

This understanding directly supports formulating military objectives and strategy, acquiring and sustaining Air Force systems, determining

E–3 Airborne Warning and Control System
While ISR platforms have evolved, the mission remains the same—provide the fullest possible understanding of the adversary to the commander.

planning and conducting military operations, and identifying the adversary's strategic, operational, and tactical centers of gravity. ISR doctrine provides a framework within which meaningful intelligence should be developed and used to support the joint force commander's (JFC) military objectives.

Integrated ISR assets and resources directly support the Air Force's ability to provide global awareness throughout the range of military operations. ISR contributes to our commander's comprehensive view of the battlespace, by providing the commander with our adversary's intentions, capabilities, and vulnerabilities. *ISR also plays a key role in ensuring the Air Force executes one of its core competencies—Information Superiority.* Information superiority is achieved by exercising our information operations capabilities. **The two pillars of information operations, information-in-warfare and information warfare, though separate and distinct, must be closely integrated with each other and with all aerospace power functions.** *ISR contributes to information superiority as a distinct information-in-warfare operation that is fully integrated into all aerospace operations.*

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December 1998

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INTRODUCTION

PURPOSE

This Air Force Doctrine Document (AFDD) outlines the fundamental principles and operational-level Air Force doctrine for intelligence, surveillance, and reconnaissance (ISR) and supports basic aerospace doctrine. It should be used to plan, prioritize, task, coordinate, and execute ISR operations as well as to educate and train ISR forces as an integral part of the information-in-warfare aspect of information operations as outlined in AFDD 2-5, Information Operations.

APPLICATION

This AFDD applies to all Regular, Air Force Reserve, Air National Guard, and civilian Air Force personnel. This doctrine is authoritative but not directive. Commanders should exercise judgment when applying this doctrine to accomplish their missions. It is intended to assist commanders in planning and conducting ISR operations to accomplish assigned missions.

SCOPE

Air Force ISR doctrine provides guidance for ISR participation in aerospace missions. A common doctrine, shared by all elements of a Service, helps ensure ISR organizations provide their commanders and forces with timely, accurate, and relevant information. Doctrine is a guide for the exercise of professional judgment rather than a set of inflexible rules. It describes our understanding of the best way to do the job. The doctrinal statements in this document are general–they are to be implemented through tactics, techniques, and procedures (TTP). These are articulated in unified and major command and field operating agency publications, as well as unit concepts of operations, operations plans, and other supporting documents.

CHAPTER ONE

INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR) VALUE TO OPERATIONS

> ***What enables the wise sovereign and the good general to strike and conquer, and achieve things beyond the reach of ordinary men, is foreknowledge.***
>
> **Sun Tzu**
> ***The Art of War***

ISR DEFINED

Intelligence, surveillance, and reconnaissance (ISR) are integrated capabilities to collect, process, exploit and disseminate accurate and timely information that provides the battlespace awareness necessary to successfully plan and conduct operations.

The goal of ISR operations is to provide precise, timely intelligence to the warfighters. We can best achieve this goal by capitalizing on the inherent synergies that exist among our ISR systems. Synergy is defined as the interaction of individual parts so that the total effect produced by their working together is greater than the sum of their individual efforts. Together intelligence, surveillance, and reconnaissance operations provide the key pieces of intelligence information that help the Air Force achieve information superiority, one of our core competencies. The synergistic effect of ISR operations also provides the best possible intelligence to the combat commander, giving him or her 'actionable' and predictive intelligence that can be quickly used to make operational decisions.

Intelligence, then, is the product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas; it is the information and knowledge about an adversary obtained through observation, investigation, analysis or understanding. *More specifically, the Air Force understands that intelligence efforts will primarily focus on*

Predator Unmanned Aerial Vehicle (UAV)
UAVs like the Predator will play a growing role in Air Force ISR operations.

foreign military capabilities; political groups; political, social, and technological developments; or certain geographic regions.

Surveillance is defined as the systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means. The Air Force perspective emphasizes that surveillance operations are sustained operations designed to collect information by a collector, or series of collectors, having long dwell time and clear continuous collection capability.

Reconnaissance is defined as a mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. The Air Force perspective emphasizes that reconnaissance operations are transitory in nature and generally designed to collect information at a single point in time by a collector that does not dwell over the target or in the area.

The information derived from surveillance and reconnaissance, converted into intelligence by fusion and analysis, may be used to formulate strategy, policy, and military plans; to develop and conduct campaigns; and to carry out military operations. Air Force surveillance and reconnaissance assets are not inherently strategic, operational, or tactical in nature, but they can be used to gather information to meet requirements at any or all of these levels.

ISR VALUE

ISR is a significant contributor to all of the Air Force's core competencies while specifically impacting the ability to attain information superiority in support of the Air Force concept of global awareness and command and control. (See also AFDD 2–5, *Information Operations.*) ISR supports…

- **Air and Space Superiority** by increasing the flexibility of forces.
- **Precision Engagement** by enhancing the effectiveness of operations.
- **Global Attack** by increasing responsiveness.
- **Rapid Global Mobility** and **Agile Combat Support** by minimizing the expenditure of vital resources and by improving the security of support forces.

In addition, *ISR helps achieve* **Information Superiority** *by providing valuable integrated information essential to the success of a broad array of Air Force missions and activities.* Examples of how ISR can support these missions and activities are given below.

Counterair, Counterspace, and Counterinformation

Successful aerospace control enables US and coalition forces to freely and effectively exploit the air, space, and information realms while simultaneously controlling the adversary's use of those realms. To meet commander's objectives and control the operating environment, ISR must be integrated into campaign planning. ISR must provide timely, tailored, and accurate support required to meet the commander's campaign objectives. Specifically, ISR contributes to the popula-

Atlas Rocket During Launch
ISR supports many Air Force missions and activities including counterair, counterspace, and counterinformation.

Artist's Conception of the Airborne Laser (ABL)
ISR will help the commander use new weapons systems to exploit and attack adversary vulnerabilities. The ABL is the product of new technologies and will play a key role in counterair operations.

tion of air and space orders of battle, characterizes integrated air defense systems, and exploits and analyzes the vulnerabilities of adversary information operations capabilities. ISR makes full use of existing data and helps develop collection requirements for continuing, new, or more explicit data requirements, based on the interpretation of campaign objectives. Successful campaigns depend on well planned and well integrated ISR operations. ISR also contributes to air, space, and information superiority by providing information critical to fielding and sustaining counterair, counterspace, and counterinformation weapon systems.

Strategic Attack, Interdiction, and Close Air Support

ISR provides the information from which theater campaign planners discern strategic effects that can paralyze an adversary and improve the efficiency and effectiveness of aerospace operations to achieve the JFC's objectives. Interdiction relies on ISR to provide the information used to determine which key nodes or lines of communication must be affected in order to halt an enemy force. Close air support requires dominant ISR to determine the threats to mission aircraft and the location and status of their targets. Finally, ISR is crucial when a campaign planner must determine the weight of effort required and priority of each mission area.

Air Mobility Operations

ISR provides essential information for the success of a variety of Air Force support activities. ISR provides a threat display along air lines of communications, to include threat and infrastructure data associ-

C–130 Airlift Operations on Unimproved Airfield
ISR-provided current threat data is critical to successful air mobility operations.

ated with en route and destination airfields as well as potential drop and landing zones.

Common Operational Picture

ISR contributes in many ways to the overall information effort, most notably in allowing commanders and decision makers to "know the enemy" and operate smarter. The most effective means of achieving this is through the ISR input to the "Common Operating Picture," whether defined in a strict systems sense or as an abstract construct.

Agile Combat Support

ISR contributes to agile combat support in several ways. For example, ISR supplies a complex threat backdrop for education and training efforts. ISR can help the commander identify needed support resources, assets, or personnel for particular peacetime, crisis, or conflict situations or environments. ISR operations help provide the key pieces of information necessary for the Air Force to successfully research, design, develop, test, evaluate, operate and sustain a variety of weapon systems needed for a wide range of aerospace operations.

Force Protection

ISR is vital to force protection activities. Information gathered and processed through ISR is used to provide near-real-time (NRT) threat warn-

Security Forces Training

ISR can help commanders determine the threat to their forces from terrorist or other hostile groups and enable them to quickly respond with the necessary security forces.

ings directly to the affected forces (e.g., theater missile defense, terrorism). It also provides intelligence production centers with data to conduct force composition assessments, estimates, and trend analysis (e.g., identification of unauthorized personnel and vehicles, identification of unusual travel patterns, medical surveillance, etc.).

Special Operations and Search and Rescue

ISR supports special operations (SO), search and rescue (SAR), and combat search and rescue (CSAR) forces with information to conduct planning, rehearsal and mission execution. Once these forces are deployed, they become both a customer and producer of ISR data. Generally speaking, the ISR support supplied to SO, SAR, and CSAR is normally restricted to NRT situational awareness information but can also include identifying specific targets of opportunity or providing battle damage assessment (BDA) verification. Special operations forces (SOF) may be more dependent on robust and timely ISR than any other force for successful mission planning and execution. The level of detailed information required to support a successful direct action mission or special reconnaissance operation can far exceed the information required to execute a conventional air strike.

Military Operations Other Than War (MOOTW)

ISR is vital to MOOTW in that it provides near-real-time information directly to the on-site commander providing information critical to assess-

C–130 Dropping Chemicals on a Forest Fire
ISR-derived information can help aircrews prepare for unique military operations other than war.

ing the current situation. ISR can also provide information to allied forces and governments for a range of civil and military purposes. Specific data types include broad area and focused imagery, lines of communication status, force/general population composition and distribution, trend analysis, and counterintelligence (CI) activities. Also, ISR is the key to providing force protection to on-site personnel as well as in-bound forces. ISR data is distributed to on-site commanders via broadcasts, dedicated communications, and face-to-face dialogue. In addition, ISR data is provided to intelligence production centers through various reachback mechanisms thereby enabling these centers to conduct detailed ongoing and post-mission analysis.

STRATEGIC, OPERATIONAL, AND TACTICAL ISR

ISR supports strategic, operational, and tactical operations by providing information and services to a divergent set of customers, ranging from national to unit-level decision makers.

Strategic

ISR is required at the strategic level to formulate national strategy, policy, and plans. The goal of strategic-level intelligence is to provide accurate, timely, and predictive information to enable decision makers to take appropriate actions before crises develop and to support the decision makers as crises unfold. ISR is also a key player in research and development (R&D), weapon system acquisition, and other national-level programs.

Operational

Operational-level ISR provides the information crucial to planning and executing theaterwide aerospace operations that accomplish the JFC's objectives. For example, campaign planners rely on ISR to provide the intelligence information crucial to understanding an adversary's weaknesses and key nodes that can be effected by aerospace power. Intelligence analysis helps define the vulnerable, vital elements of an adversary's national structure and military capabilities. Finally, ISR provides the means by which the effects of the aerospace operations are measured.

Tactical

ISR support at the tactical level of operations is primarily focused on tactical threat warning, support to mission planning, targeting, and combat assessment. Threat assessment, although performed at every level of military operations, is most common and critical at the tactical-level. This includes current assessment, defense and penetration analysis, and warning. Required information, such as target imagery, must be immediately available to support the air tasking order (ATO) and mission planning cycle. Wing and squadron personnel also input to the ISR process with annotated aircraft cockpit video and reports based on aircraft sensors and aircrew debriefs. These inputs directly impact BDA and retargeting decisions.

MC–130 Dropping Flares
ISR provides tactical threat warning and supports mission planning.

AIR FORCE ISR PRINCIPLES

General

The purpose of ISR operations is to provide intelligence information to commanders and decision makers at all levels, helping them reduce uncertainties in the decision-making process. *To be effective, ISR products must be responsive to the commander's or decision maker's needs.* Intelligence derived from surveillance and reconnaissance products that does not help reduce uncertainties in the decision-making process is unresponsive. By adhering to several principles, ISR personnel can maximize intelligence support to the consumers. These key principles are discussed below.

Integration

Surveillance and reconnaissance operations and the intelligence process must be fully integrated to meet the timeliness and accuracy requirements of aerospace power. Intelligence is a vital portion of the entire planning process. A close working relationship between ISR and strategy, planning, and execution functions during this process will foster the flow of essential information. The commander considers both the capabilities and limitations of ISR systems and organizations in the decision-making, planning, preparation, execution, and assessment processes. Similarly, as an essential element of operations, *ISR must be fully aware of mission goals and objectives and integrated into the operational environment, at all levels.*

Accuracy

To best support Air Force operations, ISR-derived products must be as accurate as possible. *Accuracy implies reliability and precision. This requires corroboration and analysis of all available information.* Extensive knowledge of adversary strategy, tactics, capabilities, and culture enables ISR personnel to anticipate actions in order to provide the most complete and exact picture possible to planners and operators. Accuracy also aids commanders in defeating adversary deception efforts. Geoposition accuracy is a crucial requirement for target acquisition, especially with the employment of precision-guided munitions. Sensors acquire information that enable targeteers to produce target locations or aim points suitable for the accurate employment of specific weapon systems. Lastly, one of the most demanding tasks for ISR personnel during emerging crises is the

need to balance requirements for accuracy with responsiveness. Judging the appropriate balance between accuracy and expediency requires very close coordination with operations planners.

Relevance

> ***One commander's thoughts on relevance: "Don't build me a watch, just tell me what time it is…"***
>
> **Anonymous**

Relevance in ISR means that the ISR product is tailored to the warfighter's needs. *Intelligence information and collection requirements should be directly applicable to determining, planning, conducting, and evaluating operations. ISR-derived intelligence should focus on the command's potential, planned, and ongoing courses of action.* Part of insuring the relevance of intelligence to the warfighter means that ISR planners must consider the suitability of specific surveillance and reconnaissance assets to the commander's objectives. Planning the employment of surveillance and reconnaissance assets is based on an asset's capability and its suitability, within the context of the overall collection plan, to meet user requirements. Suitability also applies to the format of the processed intelligence. Both the information and the format must be useful to the user.

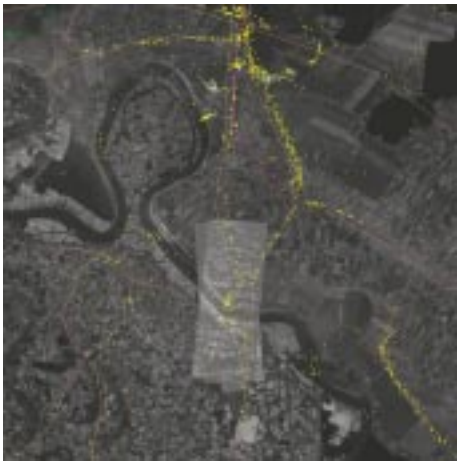
Timeliness

ISR products must be available in time to plan and execute operations as required. This principle applies to identifying and stating requirements, collecting information, and producing 'actionable' intelligence. Old intelligence is history. *Timely intelligence is essential to prevent the use of surprise by the adversary, conduct defense, seize the initiative, and use forces effectively.* The dynamic nature of ISR can provide information to aid in a commander's decision-making cycle and constantly improve the commander's view of the battlespace. An essential element of timeliness is the responsive nature of US Air Force surveillance and reconnaissance assets. These assets are made available to collect information when and where required. The information is then disseminated to the appropriate processing agency or user based on established collection or reporting requirements. However, since surveillance and reconnaissance assets are limited, responsiveness is often driven by the commander's objectives, priorities, and specific missions to be accomplished. Commanders examine the range of missions to be accomplished and ensure appropriate and

sufficient surveillance and reconnaissance assets are available. Finally, insuring communications connectivity throughout the ISR "system" is the key to delivering timely intelligence to consumers.

Fusion

Information from many sources is combined, evaluated, and analyzed to produce accurate intelligence. This process is called fusion. *Fusion helps defeat adversary efforts to deny information and helps overcome the inherent limitations of friendly collection systems that inhibit the ability of a single source to provide adequate information for decision making.* Fused information from multiple sources provides the user with a more complete picture of the battlespace. However, care should be taken not to promote fusion at the expense of timeliness. For example, significant single-source information that relates directly to a planned or current operation or force protection (a previously undetected surface-to-air missile (SAM) site near the target) should be sent to users immediately.



Fusion of Collected Intelligence Surveillance and Reconnaissnace Data Into a Common Operational Picture for Situational Awareness

Accessibility

Intelligence information must be readily accessible to be usable. *First, intelligence must be easily retrievable*; ISR personnel must be able to "get at the information" before they can disseminate, process, exploit, or analyze it. Massive amounts of information are of limited value if it cannot be correlated with other intelligence. *Second, both ISR personnel and the consumer must have the appropriate clearances to access and use the information. Third, ISR products should always be classified at the lowest possible classification consistent with security.* Understandably, some intelligence requires extraordinary protection (e.g., to protect sensitive sources and methods or the fact that certain knowledge is held). Finally, accessibility ensures the widest possible dissemination and use, particularly in multinational or coalition operations.

Security

All personnel working ISR-related issues must protect classified information and sensitive sources while keeping commanders and their staffs fully informed. *Protection of classified information and sources must be consistent with established Department of Defense (DOD) policies and procedures, even if operations are conducted with coalition partners.* The difference between peacetime and combat policies and priorities must be determined ahead of time and well understood. Detailed guidance on declassification, sanitization, and releasability should be developed and disseminated for crisis operations. Criteria, authority, and procedures for declassifying or sanitizing intelligence should be available at all appropriate levels and tested during selected exercises. *Avoid over classification and unnecessary compartmentation since they can prevent personnel from accessing intelligence they need.* If current directives are too restrictive to meet current operational requirements, request additional guidance from the appropriate (often the originating) organization.

Survivability, Sustainability, and Deployability

Intelligence resources, activities, and communications must be survivable to ensure support is available when needed. *Important components of survivability include redundancy of critical intelligence information, protection against adversarial information warfare operations, and hardening of communications capabilities.* Accordingly, all levels of command must develop concepts of ISR operations that provide for continuity even if communications are severely stressed or lost. **Sustainability is vital for all surveillance and reconnaissance systems.** A system's ability to maintain the necessary level and duration of operations de-

Expeditionary ISR assets deploying Contingency Airborne Reconnaissance System—Deployable Ground Station

pends on ready forces, material, and consumables in sufficient quantities to support stated requirements. Deployability has to be built into our systems. They must be rugged, small, and lightweight. They should be easy to transport and set-up and capable of immediate connectivity. Finally, from a macro view, ISR-derived information is a large part of the support that goes into the survivability and sustainability of every weapon system acquired and maintained by the Air Force.

Unity of Effort

Organizations at all levels should have clearly defined functions that minimize duplication, maximize sharing of information among Services, and are mutually supportive. As part of unity of effort, ISR personnel must maintain a close relationship with both the operations and acquisition communities. Unity of effort also requires a focus on not only joint, but also allied and multinational forces' intelligence requirements and production. These needs must be agreed upon and tested in advance of operations. Face-to-face discussions among targeteers, analysts, and specialists result in centralized target development and assessment.

Interoperability

Interoperability is a critical aspect of any intelligence, surveillance, or reconnaissance system. *Interoperability; commonality; reliability; and robustness of sensors; and command and control (C2) systems are crucial to the responsiveness, survivability, and overall effectiveness of a sur-*

ELINT Technical Analysis

ELINT analysis helps identify current and future electronic warfare threats to Air Force assets. It forms the baseline for researching, developing, and fielding countermeasures to those threats.

veillance and reconnaissance system. Interoperability results from the crossflow of information among the ISR, acquisition, and operations communities. ISR systems have to transmit accurate and timely information. Interoperability, commonality, and connectivity improve and unify surveillance and reconnaissance capabilities and enhance planning and mission execution. They also improve the overall ISR capability through cross-cueing, information enhancement, and analytical exchange to accurately portray the battlespace. This multidiscipline, multisource approach reduces the possibility of being deceived by an adversary. It also capitalizes on the investment by other Services and joint activities in ISR capabilities.

CHAPTER TWO

THE ISR PROCESS

In the Gulf War, our commanders knew where the friendly forces were and where the enemy was to an unprecedented degree. This was a result of a number of things: spy satellites, AWACS, JSTARS, airborne reconnaissance-all of these things put together allowed us to have an enormous knowledge of what was going on across the whole battlefield.

Representative Les Aspin, 1991

GENERAL

This chapter outlines how the ISR process works to satisfy an identified information need and outlines a notional example of the ISR process in action.

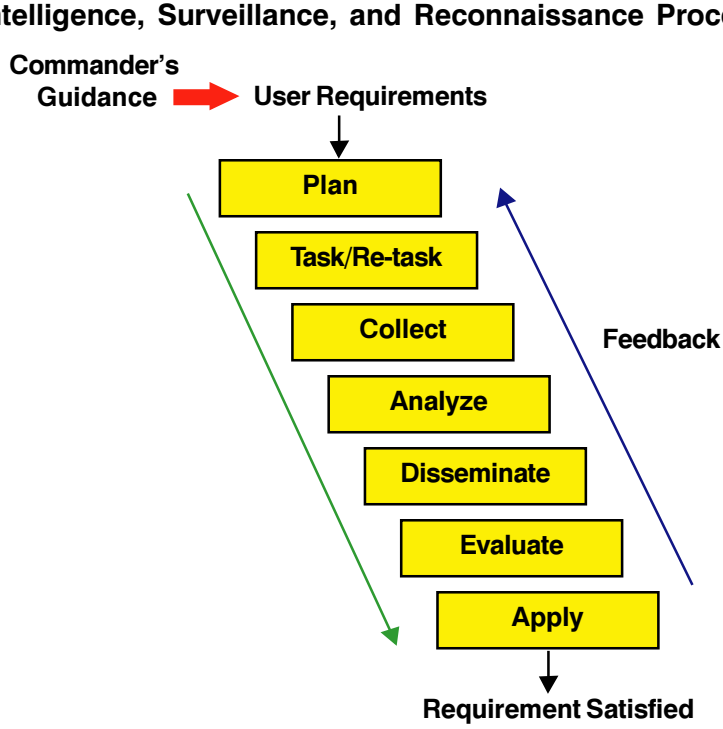


Figure 2.1. The ISR Process

THE ISR PROCESS

The ISR process has seven steps and is continuous (see figure 2.1):

- **Planning collection to satisfy the requirement.**
- **Tasking the collection.**
- **Executing the collection.**
- **Analyzing the data collected.**
- **Disseminating the processed data.**
- **Evaluating the information.**
- **Applying the information provided.**

To 'start' the process, a requirement for information is identified. These requirements typically flow from the commander's guidance, but some requirements may also come from the National Command Authorities (NCA) or other senior level decision makers. The focus here is on the commander's requirements.

Prior to hostilities, the most critical of these requirements are identified by the commander as the commander's critical intelligence requirements (CCIR). The CCIRs then drive the development of detailed essential elements of information (EEIs). *The designation of intelligence requirements helps to ensure ISR efforts are focused on the most critical information needed to support foremost, the warfighters, and also support Air Force acquisition efforts, and defense policy.* Before hostilities begin, a production requirement may be written by a user to identify specific intelligence information. Once hostilities are initiated, and as they continue, new direction and guidance evolve, creating new requirements or modifying existing requirements.

The information requirement must then be validated. Does the requirement meet the commander's concept of operations? Has the information been acquired but not distributed to the requester? Are there other ongoing operations that might satisfy the requirement? If any of these conditions are met, the requested ISR mission may not be necessary. ISR requirements are validated by the theater collection management authorities typically imbedded in the CINC's or JFC's staff. Collection priorities are deconflicted at the theater and national levels. Once validated, an intelligence requirement becomes a collection requirement and the planning process begins. ISR collection requirements are determined in es-

sentially the same manner during peacetime, crisis, and war. However, in cases where real-time or NRT information is required, it may be necessary to establish ad hoc procedures in theater to satisfy the immediate requirements.

Planning

The planning process begins once a requirement has been established and validated; it is then prioritized among the other requests for information. *As intelligence collection requirements are aligned with available collection capabilities, the planning process addresses factors such as the availability of ISR assets, platform and sensor capabilities, adversary threats to ISR assets, and timeliness of the ISR response. These factors when weighed together affect how ISR assets are tasked and employed.*

In order to make the planning process more efficient, information requesters must clearly articulate their intelligence collection requirements and allow the collection managers and operations planners to decide the best way to meet the requirements. Collection managers will first determine if any additional collection is required to meet the requestor's needs. If new collection is required, collection managers will coordinate with the operations planners to determine what organic ISR asset should be tasked to satisfy the requirement. If organic assets are required *and* available, then the appropriate unit will be tasked. If organic assets are required and not available to satisfy the request and the request is still considered valid, then the request is forwarded to a higher echelon for consideration.

- At the national level, the Joint Staff J–2/Defense Intelligence Agency (DIA) conduct long-range ISR planning, form intelligence task forces in response to crises, and augment subordinate joint force staffs with National Intelligence Support Teams (NIST). These teams, in addition to other duties, help focus ISR planning and collection requirements and provide an additional conduit for two-way communication between theater- and national-level ISR collection management efforts.

- Above the component force level, the theater commander in chief (CINC) will provide collection, processing, production, and dissemination capabilities and establishes priorities for ISR operations that generally conform to national and theater objectives. Further, the JFC's or theater CINC's staff produces theater plans, such as the operations plans (OPLAN) and concept plans (CONPLAN), and tailors theater ISR assets to meet crisis requirements. The combination of objectives and

guidance, threats, force capabilities, and system availability requires thorough analysis and effective coordination among all elements that plan ISR operations. Lower echelon collection requirements are often passed to theater collection managers where the redundant requirements are deconflicted. For peacetime, contingency, and wartime operations without an established joint task force (JTF), the theater collection managers and operations planners coordinate their efforts in the ISR planning process. For contingency and wartime operations with a JFC exercising operational control (OPCON) of the ISR assets, the joint air operations center (JAOC) collection managers and operations planners coordinate their efforts in the ISR planning process in the place of the theater process. The end results of the JAOC planners' efforts are included in the ATO and other tasking mechanisms as they are developed.

- At the operational level, the Commander, Air Force forces (COMAFFOR) [peacetime, contingency, or wartime], normally the joint force air component commander (JFACC) [contingency or wartime], plans and determines the best way to employ ISR assets to achieve maximum effectiveness while minimizing risks. The process of planning and directing ISR operations includes identifying and validating the need for the operations, and if a need is determined, prioritizing the operation. At this level, ISR planners consider the tradeoffs of survivability, weather effects, and information acquisition. For example, if land operations are of primary concern, the COMAFFOR may wish to position air ISR assets in an optimum location to ensure maximum responsiveness in support of ground operations. However, if the adversary poses a significant threat to the assets, the COMAFFOR may need to disperse or reposition assets to improve their survivability. If organic ISR assets are not available, then alternative arrangements should be developed with outside supporting agencies to satisfy the information requirement.

- The detailed ISR planning at the unit level is accomplished based on information contained in the higher headquarters scheduling messages and prioritized objectives from theater and national collection managers. For contingency and wartime operations, the ATO, airspace control order (ACO), and special instructions (SPINS) take the place of peacetime tasking messages. Planning takes into account: 1) priority, 2) current and anticipated threats, 3) tactics necessary to both accomplish the mission (i.e., scale, run-in heading, or oblique versus vertical photography) and defeat the threat, as well as, 4) weather and geographical features.

Tasking

Once the planning process is complete, the ISR assets are tasked to collect information to satisfy the requirement.

- At the strategic level, the Joint Staff J–2/DIA coordinates tasking of national reconnaissance systems, manages the Department of Defense (DOD) human resources intelligence (HUMINT) program, coordinates with the intelligence community on other collection programs, and responds to requests for information (RFIs) submitted by theater intelligence centers.

- At the theater level, for peacetime operations, the COMAFFOR's ISR managers task platforms through peactime scheduling messages and assemble a prioritized list of collection objectives for sensor tasking. During contingency and wartime, the JFACC's ISR managers task platforms through the ATO and assemble a prioritized list of collection objectives for sensor tasking.

- Finally, assets may also be tasked while the mission is ongoing. Changing situations may dictate ISR assets be reassigned from their planned mission to support a new requirement. The capabilities of the asset being retasked will determine the success of the reassigned mission. For example, ISR assets with long-loiter times or frequent revisit rates generally have the flexibility to respond to dynamic retasking. Dynamic retasking occurs when the requester identifies a time-sensitive need after the appropriate ISR asset has already been tasked. Dynamic retasking does not necessarily imply that a track or an ISR mission must be changed, rather it means that a higher priority collection requirement has emerged that a platform may have the capability to collect. However, the same asset may not have the right sensor configuration to successfully accomplish the new tasking. Thus, commanders must carefully consider the advantages and disadvantages before deciding to retask assets executing their pre-planned mission.

Collecting

Collection execution involves accomplishing the assigned mission. For airborne systems, the wing or squadron commander normally has the responsibility to accomplish the ISR mission. For ground-based systems, like special operations forces (SOF) or HUMINT, the responsibility lies with the competent authority at the tactical level. In all cases, tactical-

Hunter UAV
New technologies will aid in collection of ISR data.

level commanders must evaluate the risks (threat, tactics, weather, safety, and logistics, for example) involved to complete the mission successfully. The COMAFFOR or JFACC is the final authority on determining whether the benefits of successfully accomplishing the mission outweigh the risks involved. However, the executing commander normally provides inputs concerning these risks during the decision-making process.

Analyzing

> ***True genius resides in the capacity for the evaluation of uncertain, hazardous, and conflicting information.***
>
> **Winston Churchill**

This step involves converting information into finished intelligence through fusion and analysis. **Fusion involves combining raw data from different collection platforms together with previous analysis to achieve a balanced and clear understanding of an adversary's capabilities and intentions. Analysis involves using the human mind and its associated knowledge and experiences to evaluate the utility and veracity of received information.** Received information is only raw data until it has been fused and analyzed. *Almost all available information or raw data is fused and analyzed and then packaged to create timely products that will satisfy the commander's priority intelligence requirements (PIRs).*

While most raw data must be sent to intelligence centers for analysis and subsequent production, advances in modern technology are changing the way in which some information is processed and produced into intelligence. Some ISR assets possess an onboard data processing capability allowing some of the surveillance and reconnaissance data to be automatically processed into correlated intelligence and broadcast directly to users or decision makers in near-real-time (NRT). This kind of intelligence information supports the 'sensor-to-shooter' concept wherein actionable information can be passed directly from an ISR sensor to a weapons platform that can quickly employ weapons against a target. However, while NRT data may satisfy many requirements, much of the necessary operational information requires analysis and fusion before dissemination.

- At the strategic level, the Joint Staff J–2/DIA provide analytic estimates, report on adversary capabilities, and activate an interagency BDA cell to directly support targeting missions.

- Above the component force level, the theater CINC's staff provides theater assessments, maintains data bases, produces some target materials for operating forces in an AOR, acts as overall BDA validation authority, and supports the J–3 in the combat assessment process. Joint force J–2s maintain knowledge of adversary and terrain, conduct target development and nomination, and report operational BDA.

- At the operational level, intelligence personnel update databases; perform target analysis, development, and nomination; produce target materials; and report mission BDA. The Air Force, in a reachback role, provides air-related intelligence and information warfare analytical products and services unavailable in the theater or through the normal chain of command. Depending on theater capabilities, reachback is available during the readiness, deployment, employment, sustainment, and redeployment phases of conflict.

Disseminating

Dissemination of ISR products continues the cycle by giving the user information required for application in a timely manner. *Intelligence required 'before the fight' but received 'after the fight' is not useful. Dissemination may take the form of electronic transmission, hardcopy annotated imagery or maps, direct threat warnings, written reports, or briefings.* The dissemination process requires continuous management. Without effective management, communications paths can become saturated by

Circular Reporting During Bosnia Operations

Several times during Operation Provide Promise and Deny Flight, [US operations in Bosnia] information collected from US sources was passed to NATO officials, who later reported the information back into the US intelligence system. The same thing happened in reverse. This "circular reporting" was especially true of air defense radar indications.

On occasion, intelligence officers were led to believe that there were more SAM radars active than was really the case and it took time to deconflict apparently different reports about seemingly distinct radar sites.

SA–6 Gainful SAM

F–16 Fighting Falcon

Bosnian Adversaries

information from single sources being retransmitted by many intermediate collection agencies, resulting in "circular reporting."

Advances in technology are also affecting dissemination. Computers and modern communication systems have reduced the information to production timeline for delivering ISR products. Likewise, some collection systems are capable of disseminating collected information to requesters on a real or NRT basis, vastly increasing their responsiveness. This is especially important for those collection operations supporting ongoing military operations, in which the situation may be evolving rapidly and perishable information may lose its usefulness within a matter of minutes or even seconds. Implementing new "pull" vice "push" technologies and capabilities puts power in the hands of the warfighter to obtain just the pertinent information needed exactly when and where it is needed. This expanding collection capability makes interoperability, commonality, and connectivity all the more important because real-time planning and targeting systems depend on these capabilities.

- At the strategic level, national-level intelligence agencies are responsible for disseminating their own in-house analytical products to the NCA and other national-level decision makers.

- In addition, the Joint Staff J–2/DIA serves as a repository for basic databases and manages the Department of Defense Intelligence Information System (DODIIS). Intelligence from these sources is disseminated by national-level agencies.

- Above the component force level, the theater CINC's staff disseminates tailored intelligence produced at other levels and direct intelligence support to components. The theater CINC's staff also maintains archives for theater intelligence and provides tailored regional intelligence to supporting commands or components as required.

Evaluating

After disseminating the ISR products to the user, the user evaluates the product received to ensure that it satisfies the requirement. Feedback is then provided to ensure that the process continues to satisfy the requirement. The user finishes the evaluation step by deciding on appropriate application for the ISR products.

Applying

The culminating step of the ISR process is the application of the ISR product to the operational mission. The user can apply the ISR product in many different ways. Application may consist of a fusion of many products into a current intelligence briefing that includes predictive analysis of possible enemy courses of action. It may result in an updated situation display depicting enemy force locations and actions. Application of ISR products may be direct, as in the case of threat warning being provided to aircraft or retargeting of aircraft based on NRT information on the changing situation in the battlespace. Key to the application step is the ISR product being tailored to meet the requestor's need and its ability to be applied to support the operational mission.

An Air National Guardsman lays fiber optic cable for an Air Force information system. ISR data will move more quickly and securely to the warfighter through modern communication systems.

CHAPTER THREE

ISR ELEMENTS

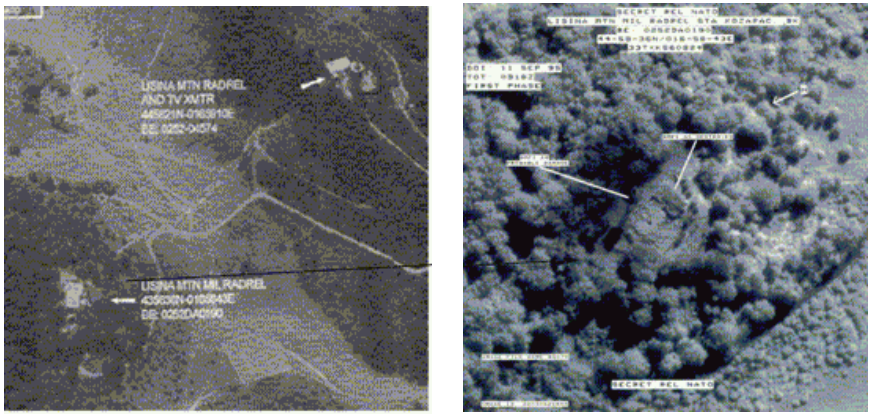
> ***The evolution of space and information technologies offers a new operational horizon from which military forces can increase situational awareness, operational tempo, information superiority, and overall responsiveness and effectiveness.***
>
> ***Organization and Employment of Aerospace Power***
> **AFDD 2**

INTELLIGENCE COLLECTION DISCIPLINES

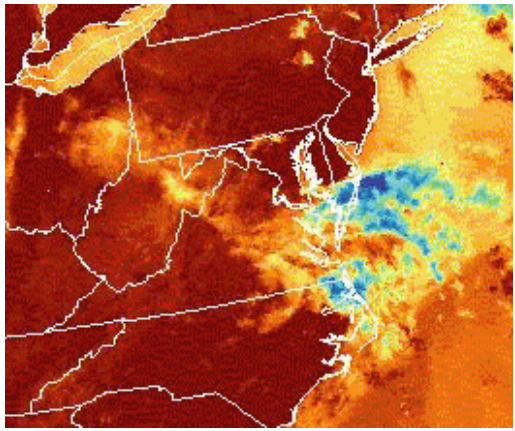
ISR resources collect data that becomes finished intelligence when processed, exploited, and integrated. This data can be collected through a wide variety of means. The following is a list of intelligence collection disciplines relevant to US Air Force ISR operations.

Imagery Intelligence (IMINT)

IMINT is intelligence derived from the exploitation of collection by visual photography, infrared sensors, lasers, electro-optics, and radar sensors such as synthetic aperture radar wherein images of objects are reproduced optically or electronically on film, electronic display devices, or other media.



Imagery Intelligence (IMINT) can support targeting and assessments.



Infrared Weather Imagery of the Mid-Atlantic States

Imagery intelligence involves the collection of images that are recorded and stored (on film, digitally, on tape, etc.). These images can often identify and locate adversary military forces and facilities and give the commander insight into the adversary's capabilities and intentions. It can also provide commanders environmental and geospatial information. Those sensors that have the capability to transmit this recorded information from their platform to the requester significantly improve the timeliness of the information. Sensor systems that use photographic film are not as responsive since a significantly longer time is taken to first produce a usable image. The principal image types are optical and nonoptical. Optical imagery is essentially traditional visual photos (recorded on film, tape, or electronically) using visible light to illuminate the objects photographed. Optical imagery uses natural illumination in the portion of the spectrum that humans can perceive unaided. Nonoptical imagery includes infrared, multispectral, and radar. Nonoptical imagery extends the range of human perception by utilizing scientific means. Both optical and nonoptical imagery have advantages and limitations. Infrared, radar, and multispectral sensors detect emissions in the nonvisual portion of the electromagnetic spectrum. Infrared signatures are distorted by aerosols, moisture, and other atmospheric gases, much like the optical portion of the spectrum. Radar requires active illumination by a radio frequency pulse; the reflected return provides an image of the target. Radar will work at night and through rain and cloud cover, unlike optical and infrared imagery. Radar can also show or isolate moving vehicles using Moving Target Indicator systems. Multispectral imagery uses data collected simultaneously from two or more spectral regions or bands of the electromagnetic spectrum—in other words the same scene is imaged in several spectral bands at the same time by the same sensor. The resulting image

contains more detailed information than can be obtained through the use of only one band.

Images can be divided into vertical, oblique, and panoramic imagery. Vertical imagery provides a two-dimensional, overhead view of the target. Oblique imagery provides an angled view of the target area which shows perspective and can be perceived as a three-dimensional view. Panoramic imagery combines the features of both vertical and oblique imagery by scanning from horizon to horizon.

Signals Intelligence (SIGINT)

SIGINT is a category of intelligence comprising either individually or in combination all communications intelligence (COMINT), electronic intelligence (ELINT), and foreign instrumentation signals intelligence (FISINT), however transmitted. More specifically, SIGINT uses intercepted electromagnetic emissions to provide information on the capabilities, intentions, formations, and locations of adversary forces. COMINT consists of information derived from intercepting, monitoring, and locating the adversary's communications systems. COMINT exploits the adversary's communications, revealing the adversary's intentions. ELINT consists of information derived from intercepting, monitoring, and locating the adversary's noncommunication emitters. It exploits the adversary's radar, beacon, and other noncommunication signals, allowing friendly forces, for example, to locate adversary radars and air defense systems over a wide area. FISINT consists of technical information derived from the intercept of electromagnetic emissions, such as telemetry, associated with the testing and operational deployment of foreign aerospace, surface, and subsurface systems giving the Air Force technical details of foreign weapons system development so we can respond quickly to new technological developments.

SIGINT is a unique discipline with a long and storied past. SIGINT's modern era dates to World War II, when the US analysts broke the Japanese military code and learned of plans to invade Midway Island. This intelligence allowed the US forces to defeat Japan's superior fleet. The use of SIGINT probably helped shortened the war by at least one year. Today, SIGINT continues to play an important role in maintaining the superpower status of the United States.

Measurement and Signature Intelligence (MASINT)

MASINT is scientific and technical intelligence obtained by quantitative and qualitative analysis of data (metric, angle, spatial, wavelength, time dependence, modulation, plasma, and hydromagnetic) derived from specific technical sensors for the purpose of identifying any distinctive features associated with the target. The detected feature may be either reflected or emitted. Examples of MASINT might include distinctive infrared signatures, electronic signals, or unique sound characteristics. MASINT can be collected by ground, airborne, sea, and space-based systems. MASINT can be used to monitor potential adversary technical developments and deployments, as well as emerging weapons of mass destruction (WMD) threats. While MASINT intelligence is often used in scientific and technical intelligence (S&TI) products, it is becoming increasingly important in the operational area.

COBRA BALL RC–135

Human Resources Intelligence (HUMINT)

HUMINT is the intelligence collection discipline that uses people in the area of interest to identify or provide insight into adversary plans and intentions, research and development, strategy, doctrine, and capabilities. Some examples of HUMINT collection include aircrew debriefings, agent operations, counterintelligence and SOF intelligence collection missions. HUMINT supports the NCA, combatant commanders, and operational and tactical commanders.

Open Source Intelligence (OSINT)

OSINT is the intelligence collection discipline that uses information of intelligence value that is available to the general public. Particular sources are newspapers, other publications, radio and television media, and the

Internet. OSINT processing transforms (converts, translates, and formats) text, graphics, sound, and video in response to user requirements. For example, at the national level, the Foreign Broadcast Information System provides translations of foreign broadcast and print media.

ISR RESOURCES

This section describes the types of resources employed to satisfy requirements input to the ISR process. Many of the systems that provide input to the ISR process are not dedicated ISR resources or systems. This section outlines *where* the information comes from, not *who* owns the system that produces it.

Airborne Systems

Airborne systems are one of the primary sources of ISR capabilities available to support the joint force's information requirements. These systems have varying, but complementary, operating characteristics.

Unmanned Aerial Vehicles

Unmanned Aerial Vehicles (UAVs) provide significant advantages over other reconnaissance assets but commanders must be aware of their limitations. The greatest advantage of these systems is that they normally do not put friendly personnel at risk, can have relatively long loiter times, and they are generally less expensive than today's manned high value assets. UAV limitations vary according to system and operational requirements. Once the technology has matured, UAVs will be configured with a broad range of collection capabilities to include a wide variety of signals and imagery collection techniques. Current UAVs are primarily tactical in nature, characterized by specific mission capabilities and relatively small area coverage. Future systems will provide broad

DARKSTAR UAV

UAV's have both advantages and limitations that commanders need to be aware of so that the right asset can be in the right place at the right time to collect the right information.

area coverage with more capable sensors. The range and endurance of UAVs will vary based on the particular situation and the vehicle design. Payload constraints often permit less than the full complement of sensors desired for a given tasking. However, increased payload and loiter time are available but will increase size, complexity, and cost. UAV flight paths can be preprogrammed or remotely controlled. Finally, commanders need to understand UAV capabilities to support mission requirements as well as their advantages and limitations.

Manned Platforms

Manned airborne ISR platforms and their associated ground stations generally are among the most responsive assets available. They are capable of carrying out critical missions by collecting vital information in NRT. Inhabited platforms can often recognize and respond to changing conditions and are able to modify missions while they are in progress. With their ability to fly long 'legs', they cover a large area with a mix of sensors. Many of these assets have a common data link between aircraft or with ground stations allowing them to distribute large volumes of information in NRT. Inhabited airborne ISR capabilities can be divided into two groups: standoff and penetrating.

During peacetime, the majority of airborne ISR missions are accomplished using standoff techniques. The standoff mode is used during military operations when the threat is too great to allow high value assets to penetrate adversary territory or when overflight of an area cannot be com-

RC–135

The RC–135 RIVET JOINT is an excellent example of a standoff ISR platform. RIVET JOINT can provide a wide variety of intelligence data for national-, theater-, or tactical-level ISR products.

pleted due to political sensitivities. The primary advantage of the standoff mode is that assets are relatively free from adversary surface-to-air and air-to-air attacks. The primary disadvantage is the limited depth of sensor coverage. An example of an ISR platform that uses standoff techniques is the RC–135 RIVET JOINT. Additional examples of standoff systems capable of providing ISR information are E–8 joint surveillance target attack radar system (JSTARS) and E–3 Airborne Warning and Control System (AWACS). However, these last two assets primarily function as battle management and command and control platforms; therefore, they are tasked under a different process than the one used to task ISR assets such as RC–135 RIVET JOINT and the U–2.

If necessary, ISR platforms will penetrate when the target is beyond standoff range and other systems are not available to provide the required coverage, or when weather conditions are such that standoff systems are ineffective. Standoff systems may be used in a penetrating mode when the threat has been suppressed or when mission priority justifies the risk. Because they are high value and small numbers, the main disadvantage of inhabited ISR systems is the exposure or potential exposure of personnel and equipment to adversary threats. Like UAVs, some inhabited assets are also susceptible to adverse weather conditions. Other collection capabilities, such as pods on the F–16, will allow under-the-weather imaging in a threat environment. In the future, penetrating inhabited reconnaissance will likely be limited to a relatively small set of high priority targets.

Space-based Systems

Space-based ISR systems have become an integral part of military forces providing support across the range of military operations. Space systems provide information to commanders allowing them to quickly assess the situation, develop concepts of operations, and distribute changes to their forces. However, commanders must also be aware of the advantages and limitations of these systems. Because satellites can be placed into orbits that maximize their effectiveness, the prime advantage of these systems is their ability to provide worldwide coverage of areas of interest, especially those remote or hostile areas where little or no data can be obtained from conventional sources.

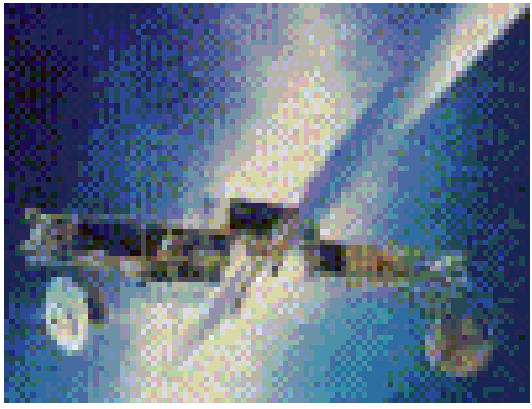
Other advantages these systems possess include mission longevity and relative immunity from adversary action. Their limitations, on the other hand, especially for surveillance systems, include the same atmospheric

and weather disturbances that affect most imagery systems. In addition, space systems' schedules are predictable; they are therefore vulnerable to denial and deception practices and signature control activities such as emission control, camouflage, etc. While able to provide worldwide coverage, tasking demands on individual space-based systems and their associated orbit requirements may limit their responsiveness. Space systems are divided into military, nonmilitary, and national systems, as outlined below.

Military Systems

Military space ISR systems employ a variety of sensor suites and provide a broad range of capabilities. During peacetime, space systems routinely support activities such as training exercises, peacekeeping operations, indications and warning (I&W), disaster and humanitarian relief, counterterrorism, and counternarcotics operations.

Space-based ISR systems' unique advantage of near global coverage allows commanders to observe areas of interest over great distances and where other ISR systems cannot be employed. Detection and warning sensors provide early detection of ballistic missile attack and down-link this information to the appropriate ground stations, allowing commanders to take the appropriate actions against ballistic missile attack. Environmental monitoring systems are crucial to understanding and reacting to weather that may affect friendly and adversary military operations. Ignorance of environmental conditions can jeopardize the success of an operation or mission. Conversely, knowledge of battlespace weather allows commanders to anticipate and exploit weather to their advantage.



Military Strategic and Tactical Relay System (MILSTAR)
Military communication satellites aid in dissemination of ISR-generated intelligence information.

Space-based ISR systems provide military forces with geographic and detailed terrain information that enhances mis-

sion planning capabilities. Additionally, these systems can often cue or be cued by other ISR systems to watch a specific area of interest, enhancing accuracy and reaction times to the users of that information. Finally, space communications and navigation systems can aid ISR operations by distributing the products generated from ISR systems and by providing ISR sensor systems with accurate positioning information.

Nonmilitary Systems

Nonmilitary space systems normally complement military space systems and include civil, commercial, and allied capabilities. These systems possess a variety of capabilities; however, in some cases their availability may be limited. Examples of these systems are weather and multispectral imagery satellites. Theater commanders may be able to task these systems directly, depending on the terms of share-use agreements with the owners.

National Satellite Systems

National satellite systems are controlled by the US intelligence community and provide direct support to the NCA and the military at all levels. These resources provide critical data and are becoming increasingly responsive to military information needs. National systems provide critical support when traditional airborne assets are denied access or when access is limited by the capability or range of other systems.

Ground-based Systems

US Air Force ground-based ISR systems are not limited to traditional intelligence collection architectures. They also include the space surveillance network (SSN), the ground-based missile warning sensor system, and those systems used by the theater air control system (TACS) for battle management, airspace management, aircraft control, and surveillance. Other ground-based "systems" include SOF and other HUMINT collection capabilities. Normally, the above units are not tasked as ISR assets but provide surveillance as a by-product of their primary mission.

Traditional Ground-based Collection

Ground sites around the world are equipped and tasked to collect information within any of the disciplines described above (e.g. SIGINT, MASINT, etc.). These sites may satisfy national, theater, or local information requirements, or various combinations of these.

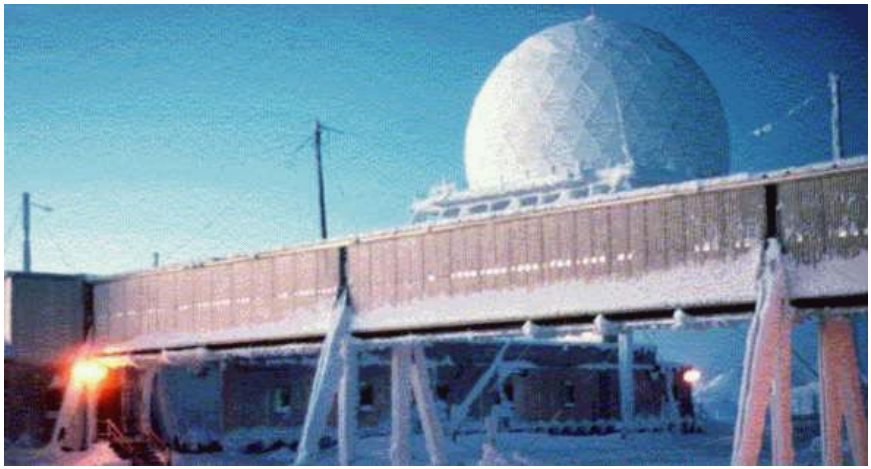
Ground-based Mobile Air Surveillance Radar
Mobile ground-based radars help complete the air surveillance picture and provide important ISR information.

✪ Air Surveillance and Acquisition Radars

The purpose of ground-based surveillance systems used to control the movement of aircraft is to provide a degree of warning and control over air resources within a designated airspace control area. Examples of these systems are ground control intercept (GCI), early warning radars, and tracking and acquisition radars. The advantage of these systems is that they provide an additional layer of control and observation that may not be available with other surveillance systems. Their primary disadvantage is their lack of mobility. Also, some of the SSN and ground-based warning sensors have unique sensor limitations and are susceptible to adverse atmospheric conditions. In addition, air defense sensors are limited to line-of-sight surveillance.

✪ Missile Warning and Space Surveillance

A significant ground-based ISR resource is the SSN and ground-based Missile Warning Sensor System. The purpose of the SSN is to detect, track, identify, and catalog all manmade objects in space. An example of an SSN system is the ground-based electro-optical deep space surveillance (GEODSS) system. SSN data is used to determine adversary space order of battle, adversary satellite overflight warning, and adversary satellite status. This information is available to theater commanders. Although ground-based missile warning sensor systems primarily provide missile warning and attack assessment of a ballistic missile attack, they also contribute to space surveillance. One example of this type of system is the Ballistic Missile Early Warning System. The SSN and ground-based missile warning sensor systems are of interest to theater commanders because they



Radome Covering a SSN Radar
Ground-based collection can come from many sources.

can provide advance notice of hostile overflights. Additionally, CINCs may be called upon to protect these systems from adversary attack if they are in their area of responsibility (AOR).

Human Resources

Despite the sophistication of long-range sensors and overhead platforms, there are circumstances in which the precision, timeliness, or access requirements (e.g., underground facilities) for reporting critical information requires a skilled eye on the target. Following are some forms of human-resourced information of ISR value.

✪ Dedicated HUMINT Collectors

Dedicated human resources may be tasked to support theater commanders or national-level agencies. Dedicated HUMINT collectors can also contribute information to the overall ISR picture and can often amplify, clarify, or verify information collected by other airborne, ground-based, or space-based assets. In many cases, HUMINT is the best and only source of adversary intentions. At present, the Air Force relies primarily on DOD and other national-level agencies to provide operational and strategic HUMINT support.

✪ Special Operations Forces (SOF)

Air Force CSAR personnel rappel from an HH–60 helicopter ISR supports SO, SAR, and CSAR forces in mission planning.

SOF are valuable assets and may provide useful information. Special reconnaissance (SR) operations may be conducted when there is a need to obtain or verify information about adversary capabilities, intentions, and activities, or to gather data about meteorological, hydrographic, or geographical characteristics of an area. SR operations complement national and theater ISR resources by obtaining specific, time-sensitive information of strategic and operational significance. SOF have technically knowledgeable observers who may be able to verify critical information about targets or target complexes. These observers attempt to defeat adversary deception efforts and transmit a more complete picture of what is happening at the target area.

✪ Aircrews

Human visual surveillance and reconnaissance is the most basic, and the oldest, method of intelligence gathering. Today, visual surveillance and reconnaissance information comes from a wide range of sources and often simply entails observer reporting and debriefing activities. While there are some limitations, observers can include aircrews flying any type of aircraft or SOF conducting assigned missions as described above. Additionally, information gained from onboard aircraft systems such as weapon system, video, and defensive countermeasure suites can provide invaluable ISR information during operations.

✪ Combat Camera

While not a dedicated ISR asset, Combat Camera and their products can play a significant role in the fusion process or in providing graphic support to intelligence assessments. The mission of Combat

Air Force Combat Camera Technician

Camera is to support DOD and Air Force senior leadership with timely and informative visual imagery that will enhance their daily operational decisions and assessments during both combat and peacetime contingencies. Combat Camera units operate still and video imagery systems that can distribute images within a six-hour response time.

CAPABILITIES AND PRODUCTS

General

Information derived from ISR sources can be used in a variety of ways to support national-level decision makers, theater commanders, and individual warfighters. In a general sense, situational awareness (SA) is a major goal of ISR operations. SA is provided at a number of levels. For example, it could mean passing direct threat warning information to a pilot in NRT or providing a theater CINC with a comprehensive picture of the AOR's battlespace. Information must be communicated to be effective. Intelligence can be tailored through formal reporting methods, informal or formal briefings, memos or background papers, annotated imagery, graphic or video presentations, dynamic databases, and NRT displays. Dissemination of intelligence products depends on the commander's requirements and, to a lesser extent, on the kind of information communicated. For example, it may be best to present current intelligence with a formal or informal briefing instead of a written product, whereas technical intelligence may be best presented as a written document. Below are some of the capabilities, processes, and products that contribute to SA at all levels and highlight the ISR contribution to air, space, and information operations.

Indications and Warning (I&W)

ISR performs vital I&W functions. Through continuous surveillance or as required reconnaissance, ISR provides timely/NRT information necessary to assess potential threats to the US and its allies. The Defense Support Program (DSP), which detects missile launches, is one example of continuous surveillance.

Space and ISR

Military satellite systems are a key enabler of the ISR process. Satellites can collect, process, and evaluate ISR data and disseminate it to many different consumers. ISR operations rely heavily on space-based assets to produce a wide variety of ISR information including I&W, current, and target intelligence.

I&W products are derived from a world-wide I&W system that 1) analyzes and integrates operations and intelligence information to assess the probability of hostile actions and 2) provides sufficient warning to preempt, counter, or otherwise moderate their outcome. Air and space force I&W relies on tip-offs from all sources at all levels. An integrated and responsive intelligence architecture must be established to satisfy theater requirements. The focus of I&W products varies at each echelon and is most specific at the operational and tactical levels. In general, I&W products focus on the following:

- Emerging crisis situations and foreign government responses to it.
- A potential adversary's politico-military intentions, motivations, and doctrine.
- Significant political, economic, or social situations that could lead to crisis triggering events in both friendly and adversary states.
- Changes in adversary force dispositions, military activities, and mobilization status.
- Adversary information operations capabilities in the region.
- Key civil or bureaucratic activities that suggest follow-on military activity.
- Status of other military forces in the AOR or operations.

Current Intelligence

Current intelligence involves producing and disseminating all-source intelligence products on the current situation in a particular area or on activities of specific groups. It is similar to I&W in that

both depend upon continuous monitoring of world events and specific activities in an AOR. Information required to produce current intelligence products includes, but is not limited to, the following:

- Adversary intentions, capabilities, and will to use military force.
- Potential adversaries' centers of gravity, operational plans, and vulnerabilities.
- Geographic, environmental, and social analysis of the operational area.
- Current and forecasted meteorological conditions that affect potential operational areas.
- Significant military and political events.
- Status of strategic transportation nodes (major airfields, seaports, and surface networks).

Current intelligence and general military intelligence (GMI) efforts are interdependent and mutually supportive. The intelligence gained during development of current intelligence forms the basis for the GMI effort and other analytical products. Conversely, GMI provides the threat backdrop (e.g., order of battle, tactics, technology, etc.) for producing accurate and meaningful current intelligence.

General Military Intelligence (GMI)

GMI produces information concerning the political, economic, and social aspects of foreign countries as well as all information on the organization, operations, and capabilities of selected foreign military forces or groups. GMI products can be tailored to specific aerospace force missions. For example, some GMI products support operational planning, while other products may support Air Force modeling and simulation or acquisition efforts. Here are some examples of GMI products:

- **Military Capabilities Assessments.** Determining the adversary's potential military capability includes the identification of forces and dispositions, an evaluation of their vulnerabilities, and an assessment of their ability to employ military force to counter the objectives of friendly forces. Specifically, military capability assessments focus on adversary leadership and C2, orders of battle, readiness, sustainability, and technical sophistication.

- **Military-related Infrastructure Assessments.** This type of assessment can provide detailed indicators of an opposing force's capabilities and vulnerabilities, including its warfighting sustainability. Examples include assessments on adversary C^2 systems, defense industries, energy production and distribution networks, and transportation systems.

Near-Real-Time and Real-Time Situational Awareness (SA)

A number of dissemination systems provide NRT and real-time threat and target status to the JFACC/COMAFFOR, operational units, and other operators. Information from various intelligence disciplines may be fused to form the threat picture, which can be conveyed to tactical users via audio, video, or data links. In the current environment of rapidly improving technologies, the capability to provide rapid, accurate, and timely information is vital.

Intelligence Preparation of the Battlespace (IPB)

IPB is a four-step systematic, continuous process of analyzing the threat and environment to help the commander better understand the battlespace. The IPB methodology is an effective analytical process that can be used during peacetime, crisis, or at the tactical, operational, and strategic levels of war.

Specifically, IPB focuses on the interrelationship between the threat and environment and the effect of that interaction on both friendly and

U–2 at Low Altitude
IPB will involve a variety of Air Force platforms.

Airpower Application of IPB, Target Intelligence, and Defense and Penetration Analysis: WWII

B–24s of the 376th Bomb Group on their airfield near Bengasi, Libya, before taking off for Ploesti.

While Allied and Axis forces were battling in Sicily, the US Army Air Forces (USAAF) staged one of the war's most daring heavy bomber raids. The target was the Ploesti oil fields in Rumania, estimated to be supplying 60 percent of Germany's crude oil requirements, a key center of gravity. Shortly after dawn on August 1, 1943, USAAF B–24s took off from bases in Libya and headed toward the heavily defended target, deep inside enemy territory a thousand miles away. Over Bulgaria, clouds broke up the B–24 formations and the bombing elements became widely separated. Tracked by German radar that alerted Rumanian defenses, the B–24s arrived over the target at treetop height without the planned element of surprise. Despite intense defensive fire from the ground and from the Axis planes, the AAF pressed the attack. In the confusion of battle, some B–24s made bombing runs through heavy smoke over targets that had already been attacked and were caught in the bursts of delayed action bombs dropped several minutes previously. Although overall damage to the target was heavy, the cost was high. Of 177 planes and 1,726 men who took off on the mission, 54 planes and 532 men failed to return.

The following page has an extract of the field order for the August 1943 USAAF raid on the Ploesti oil refineries target complex illustrating the timeless and fundamentally basic application by the Air Force of IPB and defense and penetration analysis.

Continued on next page

enemy courses of action. IPB results in the production of adversary courses of action, named areas of interest, and high-value targets, which are inputs to the JFACC/COMAFFOR campaign planning, intelligence collection, and targeting processes. At its best, IPB facilitates getting "inside" the enemy's decision making cycle. IPB is viewed by the US Air Force as a valuable methodology for focusing intelligence on the commander and the commanders' supporting C2 elements. Additional advantages include integrating analysis, collection management, and targeting processes, as well as providing a standardized analytic approach for training purposes. Air Force intelligence entities at all levels of command should use IPB principles, focusing on environmental and threat characteristics and ac-

HEADQUARTERS IX BOMBER COMMAND
APO 683, Postmaster
New York, N.Y.

FIELD ORDER NO. 58 — 28 July 1943

The Ninth US Air Force will attack and destroy the 7 principal oil refineries in the PLOESTI area on 1 August 1943 employing 7 target forces in a minimum altitude attack in order to deny the enemy use of the petroleum products processed in that area.

Annex 2 to Field Order No 58

INTELLIGENCE

1. a.(1) (a) There have been no recent reports to determine the present antiaircraft defenses of the target. Information received from sources believed to be reliable indicates that the total of heavy and medium antiaircraft guns is under 100 for the total refinery area. It is reliably reported that there are two gun positions on the roof of the railroad station directly adjacent to the Astra ROMANA oil refinery. Reliable authority asserts that one-half of the antiaircraft defense of this area has been taken over by the Germans. The same source reveals that in all probability the heavy guns are manned by GERMAN crews, whereas the medium guns are manned by Rumanians.

BALLOONS: Detailed information about balloon defenses is not available, but most recent sources of information estimate that under 100 balloons are distributed throughout the area for the defense of the refineries. These balloons are believed to be of ordinary German type and are anchored by 2.7 and 3 millimeter cables.

RDF [radio direction finding]: Enemy RDF installations are believed to be located in the valley lying east of the Danube. Expert opinion estimates that the primary function of these installations is to cover the EASTERN approach to the oilfields. The same opinion asserts that it is not possible for RDF equipment to penetrate the WESTERN mountain approach as these mountains serve to deflect the radio beam of the installations.

B–24s over Ploesti with bombs bursting on the target.

SMOKESCREEN: It is reported that the enemy has made provision for laying a smokescreen across the refineries in the event of attack.

CAMOUFLAGE: Reports have been received that the enemy has endeavored to camouflage the refineries by altering the vertical

Continued on next page

appearance of the installations.

NOTE: It is estimated that the defense of this area has been calculated against attacks developing from the EAST and NORTHEAST. Further the layout of guns, both heavy and medium, the smokescreen and camouflage have been devised for high level day or night attacks. No information has ever been received that the enemy has made provision for a low level daylight attack coming from the WEST.

1.a.(1)(b) It is known that there are 6 airfields in the area for the defense of the refineries. Both German and Rumanian fighter aircraft are located on these airfields. The most recent information as to fighter strengths will be received prior to the operation. It is most important to take into consideration the fact that neither fighter nor antiaircraft defenses have been in action for a period of one year and a resultant decline of efficiency is to be expected. It has been reported that the fighter defenses of this area are divided between the German and Rumanian Air Forces.

1.a.(2)(a) The briefed course to the target has been devised to avoid all antiaircraft defenses en route. The provisional return course is similarly not across defended areas.

1.a.(2)(b) There are no known enemy fighter airfields from the place of departure until the Danube is reached. From the Danube onward, enemy airfields have been sighted for the defense of the area. Careful watch is being kept on the current enemy order of battle in the Eastern Mediterra-

tivities that significantly influence air, space, and information operations. However, specific IPB products and procedures are left to the discretion of local commanders.

Defense and Penetration Analysis

Defense and penetration analysis provides the basis for detailed mission planning and defense suppression, as well as for assessments of friendly force vulnerabilities. For example, intelligence personnel analyze adversary force capabilities to penetrate or operate over friendly territory.

Target Intelligence

ISR operations play a prominent role in the targeting cycle by detecting, locating, and identifying targets, as well as supporting mission planning and combat assessment, including BDA. Mobile targets require NRT targeting information for the successful employment of precision munitions.

Detection is an ongoing process, using surveillance and reconnaissance assets to identify potential targets or significant changes to existing targets. Once detected, a target is accurately located within a designated geospatial reference system.

Identification involves recognizing and classifying targets in sufficient detail to give commanders the ability to make informed decisions on targeting and tactics. Multiple surveillance and reconnaissance operations may be necessary to identify and verify a target. ISR can provide the level of detail necessary to support a precision engagement of specific high-value targets.

Examples of targeting production requirements include: target threat characteristics and vulnerabilities, adversary capabilities and intentions, adversary centers of gravity, analysis of IW and other non-lethal weapons, and precise target location information and target signatures. Target intelligence products also include current imagery and accurate geospatial information.

Advances in computer and communication technology have increased the capability for intelligence information to be passed directly to the cockpit ("sensor-to-shooter"). For example, RC–135 RIVET JOINT can provide threat information to both counterair and counterland aircraft. Target imagery can be provided directly to air-to-ground aircraft. Commanders and planners must ensure proper procedures are in place to ensure effective use of this capability.

Combat Assessment (CA)

Combat assessment (CA) evaluates combat operations effectiveness in achieving command objectives and includes BDA, munitions effectiveness assessment (MEA), and mission assessments (MA). BDA is a timely and accurate estimate of damage or effect resulting from the application of military force against a predetermined objective. MEA analyzes the effectiveness of the munition's damage mechanisms and delivery parameters. Planners use this information to determine the right munition for the right target. MA evaluates the effectiveness of a tasked or apportioned mission on the adversary's warfighting and sustaining capabilities. Together, these three assessments provide information on the success or failure of military operation and determine the need for follow-up operations or modifications in planning

Scientific and Technical Intelligence (S&TI)

S&TI products address foreign scientific and technical developments that have warfare potential. This includes weapon system characteristics, capabilities, vulnerabilities, limitations, and effectiveness; research and development activities related to those systems; and related manufacturing information. ISR-generated S&TI products play a vital role in the acquisition process by allowing the acquisition community to develop new systems or upgrade existing ones to meet current, developing, and potential future threats.

Counterintelligence (CI)

Counterintelligence (CI) is critical to Air Force operations, particularly force protection efforts. Although not responsible for counterintelligence operations, ISR personnel can and do produce some counterintelligence related products. For example, threat analysis products evaluate all foreign intelligence and security services disciplines, terrorism, foreign-directed sabotage, and related threats. **CI threat estimates and vulnerability assessments identify friendly weaknesses and vulnerabilities that may be exploited by an adversary.** Various data bases maintain information on personalities, organizations, installations, and incidents. These databases can help provide indications to the motivations and ideology of potential adversaries.

ISR supports Global Awareness.

DESERT STORM: ISR and Combat Assessment

Few assertions about the Gulf War could command as much agreement as the inadequacy of battle damage assessment and combat assessment. Although regulations and operation plans detailed organizational structures to handle tasking of national reconnaissance assets, the system did not work well in practice because of inadequate numbers of trained, qualified personnel. **To complicate matters further, only a small portion of those assigned to US Central Command Air Forces (USCENTAF) intelligence during the crisis had any experience in collection management, while campaign planners failed to anticipate how massive and time-consuming the battle damage assessment process would be once the war began.**

Weather presented itself as a formidable obstacle to bomb damage assessment. **Heavy overcast during the early days of the air war prevented adequate reconnaissance of many strategic targets—most were not covered until five days after the beginning of the air campaign. This circumstance put intelligence assessments behind from the outset and derailed the prewar planning assumption that imagery of a target would be available to analysts in time for the target to be revisited, if necessary, two days later. When imagery was not forthcoming, the air tasking order process went ahead anyway, and operations planners looked to other ISR sources—mission reports and video recordings—to judge the effectiveness of the previous day's strikes.**

Collection managers had to set priorities for the imagery collected from limited assets, but these managers often had not taken part in target planning, nor were they aware of changes to the daily ATO. **Furthermore,** ***planners were unfamiliar with collection tasking procedures and did not attend meetings of the coordinating boards that assigned priorities to collection lists.*** **This meant that people not involved in planning the air campaign and who where unaware of its current direction (e.g. commander's guidance) determined each day's ISR tasking requirements.**

Imagery interpretation proved a difficult art. It was difficult to assess damage to Iraqi hardened aircraft shelters, command bunkers, and communication buildings attacked by penetrating bombs. **Analysts could see a small hole on the target's exterior where the bomb had entered, but most of the effects were contained within the target. Unfortunately, the requisite expertise on structural vulnerabilities and weapons effects largely resided in Washington.** ***All-source fusion, particularly of SIGINT and HUMINT collection disciplines, proved to be a significant adjunct to IMINT estimates and were instrumental in over-coming image interpretation shortfalls.***

Disagreements over what the air campaign bombing of strategic and tactical targets had accomplished were most manifest in the differences between Washington, theater, and component assessments—the dispute over estimates of Iraqi equipment attrition being the most notable. Washington intelligence agencies relied on national-level reconnaissance assets to determine what had been destroyed, while US Central Command (USCENTCOM) could, in addition, use theater-level ISR assets, aircrew reports, and Combat Camera video. These differences in estimates remained unresolved into a common operational picture throughout the war.

Operation "Lusty" (LUftwaffe Secret TechnologY)

During WWII, the USAAF Intelligence Service sent teams to Europe to gain access to enemy aircraft, technical and scientific reports, research facilities, and weapons for study in the US. The Air Technical Intelligence (ATI) teams, trained at the Technical Intelligence School at Wright Field, Ohio, collected enemy equipment to learn about Germany's technical developments. The ATI teams competed with 32 Allied technical intelligence groups to gain information and equipment recovered from crash sites. As the war concluded, the various intelligence teams, including the ATI, shifted from tactical intelligence to post-hostilities investigations. Exploitation intelligence increased dramatically.

On April 22, 1945, the USAAF combined technical and post-hostilities intelligence objectives under the Exploitation Division with the code name Lusty. Operation Lusty began with the aim of exploiting captured German scientific documents, research facilities, and aircraft. One team, under the leadership of Col Harold E. Watson, a former Wright Field test pilot, collected enemy aircraft and weapons for further examination in the US. The other team recruited scientists, collected documents, and investigated facilities.

Watson's "Whizzers"

WWII German Luftwaffe Me–262

German Me–163B Komet

In 1944, intelligence experts at Wright Field had developed lists of advanced aviation equipment they wanted to examine. Colonel Watson and his crew, nicknamed "Watson's Whizzers," comprised of pilots, engineers, and maintenance men, used these "Black Lists" to collect aircraft. He organized his "Whizzers" into two sections: one collected jet aircraft; the other procured piston engine aircraft and nonflyable jet and rocket equipment. After the war, the "Whizzers" added Luftwaffe test pilots to their team. One was Hauptman Heinz Braur. On May 8, 1945, Braur flew 70 women, children, and wounded troops to Munich-Riem airport. After he landed, Braur was approached by one of Watson's men who gave him the choice of either going to a prison camp or flying with the "Whizzers." Braur thought flying more preferable. Three Messerschmitt employees also joined the "Whizzers": Karl Baur, the Chief Test Pilot of Experimental Aircraft; test pilot Ludwig "Willie" Huffman; and engineering superintendent, Gerhard Coulis. Test pilot Herman Kersting joined later. When the "Whizzers" located nine Me–262 jet aircraft at Lechfeld airfield, these German test pilots had the expertise to fly them.

Watson's men traveled across Europe by jeep and occasionally by air to find the aircraft on the lists. Once found, they had to be shipped to the US. Fortunately, the British were willing to loan the aircraft carrier *HMS Reaper*. The most viable harbor for docking the carrier and loading the various aircraft was at Cherbourg, France. The "Whizzers" flew the Me–262s and other aircraft from Lechfeld to St. Dizier, to Melun, and then to Cherbourg. The aircraft were cocooned against the salt air and weather, loaded onto the carrier, and brought to the US where they were studied by the Air Intelligence groups of both the USAAF and Navy.

A U–2 pilot gives a pre-departure salute to his crew chiefs. Timely and relevant ISR information involves teamwork—from the crew chiefs through the collectors to the analysts to the warfighters.

CHAPTER FOUR

ORGANIZING, COMMANDING, AND EMPLOYING ISR FORCES

> ***Experience in combat theaters has proved the requirement for centralized control, by the air commander, of reconnaissance aviation….***
>
> **Field Manual 100–20**
> ***Command and Employment of Air Power, 1943***

COMMAND RELATIONS

Command relationships delineate the degree of authority commanders can exercise over resources. This chapter discusses ISR command relationships from the CINC, COMAFFOR, JFC, JFACC, and national perspectives. Refer to AFDD 2 for a detailed discussion of command relationships.

The Commander in Chief's (CINC) Role

The CINC employs assigned and attached forces to achieve national and theater objectives. Operational control of ISR assets is retained by or transferred to the CINC upon arrival of the assets in theater and may be delegated to the COMAFFOR. While the CINC receives OPCON authority, collection management authority (CMA) and components of CMA, such as SIGINT operational tasking authority (SOTA), are normally retained by national authorities. Upon request, CMA and SOTA may be delegated to the CINC by national authorities. The CINC is responsible for employment of these assets, regardless of parent Service or agency, to satisfy theater and outstanding component requirements. Based on guidance and direction from the CINC, the CINC's staff develops an overall collection strategy and posture for the execution of the ISR mission.

The Commander, Air Force Forces' (COMAFFOR) Role

Each CINC is supported by a COMAFFOR, normally his associated US Air Force major command (MAJCOM) commander. MAJCOM commanders may delegate COMAFFOR authorities to subordinate numbered air

force (NAF) commanders. In any joint contingency operation, a COMAFFOR is designated and serves as the commander of Air Force forces assigned and attached to the CINC. If the Air Force provides the preponderance of aerospace forces, the COMAFFOR is normally designated the JFACC by the JFC and will exercise OPCON and tactical control (TACON) authority (as delegated by the JFC) of all US Air Force forces assigned or attached to the joint force air component. When the COMAFFOR is designated as the JFACC, he normally maintains OPCON authority over assigned and attached US Air Forces forces and receives TACON authority over forces supporting the operation from other components or Services as directed by the JFC.

The Joint Force Commander's (JFC) Role

The JFC employs forces assigned or attached to the JTF to achieve campaign objectives. The JFC may retain OPCON authority over ISR assets or delegate it to the JFACC/COMAFFOR. The JFC's staff develops an overall collection strategy and posture for the execution of the ISR mission. The JTF J–2 reviews, validates, and prioritizes all outstanding intelligence requirements, whether originating from the JTF J–2 staff or a component. The JFC normally delegates OPCON or TACON authority to the JFACC who will task ISR assets to support combat operations via the ATO.

The Joint Force Air Component Commander's (JFACC) Role

The authority and command relationships of the JFACC are established by the JFC. The JFACC (when dual-hatted as COMAFFOR) will normally exercise OPCON authority over Air Force ISR assets assigned and attached to the JFC and TACON authority over those assets made available for tasking by the JFC. The JFACC is normally not delegated OPCON authority over other Services' dedicated ISR assets. In general, the JFACC's responsibility is to satisfy the JFC's requirements. If the JFACC does not have the assets on hand to satisfy these requirements, the ISR elements within the air operations center (AOC) will identify unfulfilled information requirements and will forward them to higher headquarters for resolution. Regardless of how the information is eventually gathered, it is imperative the JFACC remain aware of all available surveillance and reconnaissance capabilities that can be integrated into the air operation. The JFACC should be the area air defense commander, the ISR coordinator, and the airspace control authority, since these functions demand integration to ensure unity of command and effort.

National Surveillance and Reconnaissance Assets

National ISR assets are not normally placed under the JFC's or JFACC's OPCON authority. These assets may operate in direct support of the JFC or one of the components, either full-time or on-call, but are normally shared with other commands or components. The supporting commander or agency, upon request, will provide liaison teams to the supported commander. These teams will normally be the points of contact for coordinating their specific ISR resources and associated capabilities with the supported commander's collection managers. Collection managers forward the requirements to the appropriate command authority for satisfaction.

JFACC Surveillance and Reconnaissance Coordination

The ISR specialty team is composed of ISR personnel integrated into the AOC's four division. The JFACC's ISR specialty team collection managers and operations planners will work with the JFC and other components to effectively coordinate national and theater ISR objectives. The ISR collection elements will manage and satisfy the JFACC's information requirements. The ISR specialty team leader works with the core division chiefs, the AOC Director, and the A–2 to monitor ISR assets and other forces made available to the JFACC to conduct operations, establish priorities to support new requirements, coordinate ISR missions, and deconflict ISR operations with other air operations in the theater. Finally, the ISR specialty team leader assesses the risk versus intelligence gain and monitors ongoing ISR missions.

OPERATIONAL FUNCTIONS

The Air Force views the COMAFFOR's AOC, especially when the COMAFFOR is designated as the JFACC, as the best location to integrate the warfighter's theaterwide ISR capabilities, to include reachback ISR support. *Air Force Basic Doctrine* (AFDD 1) states that one of the responsibilities of the JFACC is to provide integrated ISR for the JFC. Subtasks of this responsibility include:

- Identify JFACC requirements.
- Manage JFC (theater-level) requirements in conjunction with other Service components and with validation from the JFC.
- Integrate and synchronize use of aerospace assets.

✪ Task theater ISR assets to satisfy the JFC's requirements.

Joint Pub 3–56.1, *Command and Control for Joint Air Operations*, states that the responsibilities of the JFACC include "functioning as the supported commander for...theater airborne reconnaissance and surveillance." Whenever joint and Service mission needs dictate, it is more advantageous to the warfighter to train, equip, organize, and operate centralized ISR under the JFACC and within the JAOC structure. The JFACC can best support ISR in strategy development and can best execute the planning, tasking, and direction of ISR missions.

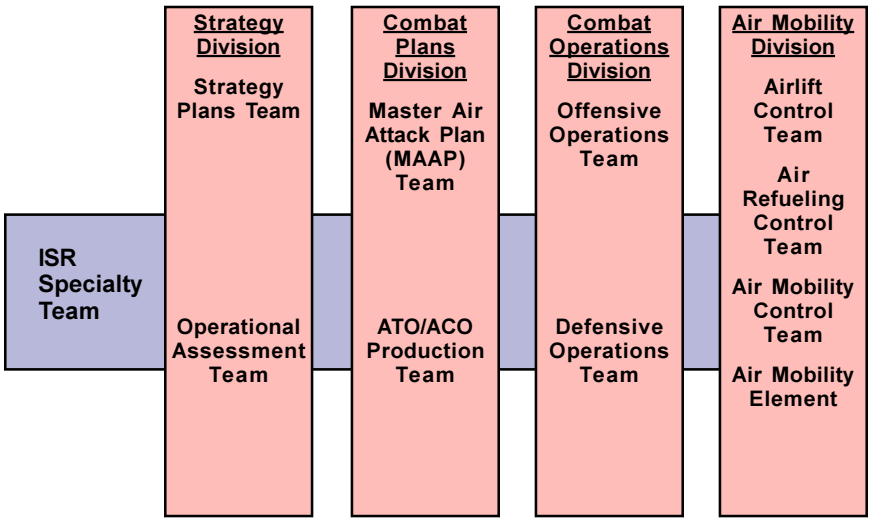


Figure 4.1. Air Operations Center Organization: ISR in the AOC

ISR Specialty Team Leader

ISR is functionally aligned, yet fully integrated, to combine sensor experts, platform experts, and intelligence experts within the four divisions of the AOC. This symmetry ensures consistency of function and general alignment of responsibilities. The ISR specialty team leader, normally appointed by the NAF Senior Intelligence Officer (SIO) or A–2 with the approval of the JFACC/COMAFFOR, has overall authority and responsibility for the ISR process within the JAOC. The ISR specialty team leader should typically be an officer with extensive ISR expertise who will report to the JFACC through the JAOC director. The ISR specialty team leader is primarily responsible for establishing the environment for successful ISR operations within the JAOC that may include

providing necessary policy, guidance, architectures, personnel, systems, and training. There is no command relationship between the ISR specialty team leader and the division chiefs in the JAOC. However, the ISR specialty team leader will monitor the ISR process and advise the JAOC director of potential improvements.

Air Component

The air components are normally organized to integrate platform, sensor, and intelligence experts. As an integrated whole, this approach provides the core expertise for aerospace surveillance and reconnaissance operations. The synergy created leads to a cohesive approach to ISR management.

The Air Force's war-fighting component at the operational level is normally a NAF. The NAF SIO or A–2 directs all-source, all-discipline cohesion and focus with the Air Force forces (AFFOR) intelligence system by providing policy and guidance. Establishing this central point in the combat theater for target development and threat assessment improves intelligence support to air operations and ensures coordination among various intelligence functions. The intelligence structure should be designed to expedite tailored intelligence to operational units. It is essential that intelligence personnel are integrated in the JAOC within Strategy, Combat Plans, Combat Operations, and Air Mobility Divisions in order to provide direct support to ATO development and execution. Certain theater- or component-level functions for which the A–2 is responsible, such as intelligence collection or production management, may be performed under the A–2 staff umbrella, or in the JAOC, depending on the situation.

The NAF SIO exercises day-to-day responsibility for intelligence support to the NAF commander. The NAF SIO is also responsible for providing a combat intelligence capability for the AFFOR commander. In garrison, an assigned air intelligence squadron (AIS) provides the core ISR expertise, processes, and personnel to the JAOC. When deployed as part of an JAOC supporting the development or execution of the COMAFFOR/JFACC's aerospace operation plan, AIS personnel develop focused air situation awareness estimates, maintain the air order of battle (AOB), electronic order of battle (EOB), and defensive missile and theater missile defense orders of battle (DMOB/TMDOB). The ISR personnel within the JAOC will also develop and nominate targets, conduct weaponeering and combat assessment, perform all-source collection management (including tasking), and support unit intelligence requirements.

Wing, Group, and Squadron Support

The primary focus of ISR at the operational wing, group, and squadron levels is the application of all-source intelligence information to sustain combat air operations. Although the wing's intelligence capability is focused within a flight of the unit's operations support squadron, intelligence personnel and assets are assigned to each operational squadron. *This ISR capability supports unit deployments, readiness training, mission planning, and other wing-level mission execution functions.* Most unit-level intelligence organizations are composed of two branches-operational intelligence (also termed "combat" intelligence) and target intelligence. Each performs a specific function. First, operational intelligence keeps the commander and aircrews informed of intelligence matters needed to perform the mission. It maintains intelligence data base holdings, provides briefings and training, and helps with mission planning. Second, target intelligence assembles and maintains mission or planning folders with related target planning documentation. Important ISR functions that may be performed at the unit level include:

- Mission planning and intelligence preparation of the battlespace support.
- Air expeditionary unit command element intelligence support.
- Defensive threat capabilities and penetration analysis.
- Mission folder construction and maintenance.
- Aircrew target study, threat training, and certification.
- Debriefing, BDA, aircraft weapons system recorded media exploitation, and intelligence reporting.
- EEI and RFI management.
- Maintenance and operation of intelligence data bases, systems, and special security office (SSO) programs.
- Identification of unit support requirements to include identifying, requisitioning, and safeguarding target materials and geospatial data for combat and training missions.

Aerospace Expeditionary Support

ISR supports the wide variety of missions executed by an expeditionary Air Force. To ensure the requisite intelligence support for these types of operational missions is available when needed, a three-part intelligence support concept must exist. **The intelligence requirements needed to support aerospace expeditionary forces for mission planning and execution fall into three categories: production support, command support, and weapon system support.** Production support provides such core intelligence data as GMI products, installation data, orders of battle, geospatial information products, etc. Command support encompasses tasks and activities such as manning and equipping a force that enable it to function. Weapon system support focuses on weapon system-unique intelligence support requirements, planning, and specialized technical analyses or functions not provided by GMI producers.

Air Control Units (Surveillance)

Air control units (surveillance) provide surveillance, early warning, airspace control, and airborne battle management capabilities for operations across the spectrum of conflict. While these units do not generally produce raw data designed for the ISR process, much of the information generated by these units is germane and useful to the ISR process and can be used in all-source fusion to create a more accurate picture of the battlespace.

Reconnaissance Units

Air Force reconnaissance units collect and process raw data for input into the ISR process. They are responsible for providing national and theater command authorities with a wide array of timely, reliable, high-quality, reconnaissance products. Air Force reconnaissance units train and equip reconnaissance personnel and their assets for worldwide employment to include peacetime intelligence gathering, contingency operation, conventional war fighting and Single Integrated Operational Plan support. Reconnaissance assets include both manned and unmanned vehicles. Reconnaissance products or data generated by these units are often the chief input into the ISR process, but critical, perishable reconnaissance data can also be routed directly to the shooter in NRT. Reconnaissance data is often fused together with other intelligence information to form a variety of ISR-related products that range from I&W products to long-range assessments of adversary capabilities.

Space Units

Space units typically operate military and national-level satellites that collect information that supports strategic-, operational-, and tactical-level decision making. Space units typically generate raw data for intelligence processing. These products, like reconnaissance products from manned and unmanned airborne systems, are also fused with various other inputs from the ISR process to create intelligence products.

Air Intelligence Agency (AIA)

The Air Intelligence Agency (AIA) is an Air Force field operating agency (FOA), subordinate to the Headquarters, USAF. AIA's mission is to gain, exploit, defend and attack information to ensure superiority in the air, space, and information domains. AIA is tasked to deliver flexible collection, tailored aerospace intelligence, weapons monitoring and IW products and services to both war-fighting and support organizations. AIA and its centers, wing, and groups support the entire range of Air Force intelligence customers providing important intelligence services, directly and indirectly, to all levels of operations.

Air Intelligence Centers

AIA's "centers of excellence" provide detailed analyses and products for Air Force and DOD customers. Specific functions of these centers include vulnerabilities and capabilities analysis on foreign aerospace weapon systems and organizations; production of tailored, customer-specific products; and support to US weapon treaty negotiations and compliance verification. Other centers provide leadership in information warfare and ISR-related activities in support of operations, campaign planning, acquisition, and testing. They also explore, apply, and migrate offensive and defensive IW capabilities for operations, acquisition, and testing. They provide technical expertise for computer and communications security and act as the Air Force focal point for tactical deception and operations security training.

Other Air Force Intelligence Units

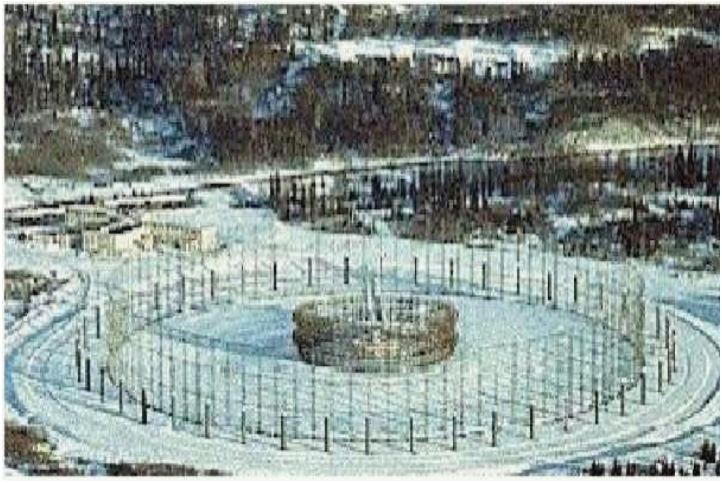
The Air Force currently has only one intelligence wing. This wing manages the planning of all-source intelligence and assists Air Force components in the development of concepts, exercises, and employment of forces to support contingency, MOOTW, low-intensity conflict, counterdrug,

Air Force ISR Integration With Tactical Data Links.
The Trojan Spirit communication system transmits and receives a wide variety of IRS information between garrison and forward-deployed locations.

and special operations. Subordinate to this wing are four intelligence groups located in the continental US, Hawaii, and Germany.

Air Force intelligence groups perform a variety of functions. Most intelligence groups are collocated with the MAJCOM they support and often manage intelligence infrastructure and programs and perform lower-echelon unit support. Other specific functions may include the production of tailored intelligence for weapons systems acquisition, mission planning and targeting, collection management, planning, logistics and readiness issues, and communications/computer system support. Some groups manage military and civilian personnel actions and programs, while others maintain imagery data bases, develop aircrew training materials, and provide reachback linkage for deployed intelligence units. Other intelligence groups have specific operational missions that relate to command, control, communications, computers, and intelligence (C4I); acquisition/research and development; space surveillance; threat warning and technical analysis; SIGINT-oriented cryptologic and S&TI support.

Intelligence squadrons collect, process, exploit, and disseminate intelligence in response to taskings from national authorities, theater commanders, and the JFACC. Intelligence squadrons conduct various missions including military capabilities and order of battle analysis, unit support, targeting support, information operations, and IMINT and SIGINT collection, processing, exploitation, and dissemination.



Signals Collection Site

ISR information comes from a wide variety of intelligence collection units and organizations around the world.

CHAPTER FIVE

EDUCATING AND TRAINING ISR FORCES

> ***How can one man say what he should do himself, if he is ignorant of what his adversary is about?***
>
> **Lieutenant General Antoine-Henri Baron de Jomini, 1838**

EDUCATION

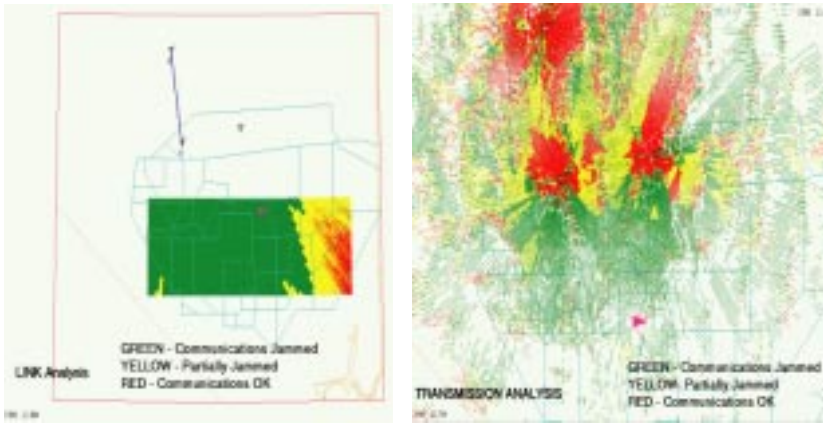
Educating and training ISR forces is an important part of supporting the ISR process. ISR professionals should, at a minimum, have a broad understanding of key ISR processes and operations, ISR-related activities, and how ISR contributes through the strategy of information operations to the goal of information superiority. For ISR professionals, formal ISR education in the many ISR disciplines should be a continuing process, progressing through the basic, intermediate, and advanced levels. The intent is to ensure Air Force ISR personnel understand the principles, concepts, and characteristics of ISR.

Finally, while not every airman needs a comprehensive course in ISR, every airman should understand that ISR is an integral part of information operations and a key enabler of the Air Force core competency of information superiority.

TRAINING AND EXERCISES

ISR operations encompass dozens of Air Force specialties performing widely varying functions. Therefore, individual training progression is best left to specialty experts. As Air Force operators, ISR professionals need to receive initial qualification training within their assigned specialty and then follow-on on-the-job training at the unit level.

Realistic training provided through exercises is essential to proficiency and readiness. Exercises train individuals, units, and staffs in the necessary skills and tools for ISR operations and ensure that staffs can plan, control, and support such operations. Planners must create realistic and challenging field training exercises, modeling and simulations, seminars,



ISR Analysis of Adversary C4I Capabilities Through Modeling and Simulation (Links and Nodes)

and command post exercises that allow commanders, staffs, and units to participate in ISR. Exercises should emphasize not only employment operations, but also deployment and redeployment phases, as well as the transition to and from war. All exercises should also emphasize command, control, and communications; intelligence; appropriate laws; force protection; information operations; and logistics coordination requirements necessary to successfully conduct ISR. Commanders at all levels should participate in exercises to familiarize themselves with the complexities and details of ISR doctrine and operations. Realistic exercises are essential for determining possible shortfalls and corrective actions to achieve success in future operations. Various US, non-DOD agencies, as well as foreign military services may occasionally participate in these training exercises. Commanders will continually assess the impact ISR training, exercises, and ongoing peacetime missions have on their units' ability to conduct wartime missions. Finally, each commander must ensure all personnel receive the required refresher training needed to perform their duties.

CHAPTER SIX

CONCLUSION

> ***If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither yourself nor your enemy, you will succumb in every battle.***
>
> **Sun Tzu**
> ***The Art of War***

THE AIRMAN'S VIEW OF ISR

Accurate and timely intelligence is an important element to achieving campaign objectives and force modernization. As an integral part of that process, ISR operations provide commanders with real-time or NRT information on adversary locations, dispositions, capabilities, technological developments, and indicators of intentions. When fully integrated and properly focused, Air Force ISR resources offer commanders a responsive and robust capability to identify, collect, process, analyze, and disseminate information to directly support their decision-making process.

ISR products and resources are versatile—ISR products and resources can support both current and planned operations, the crisis-oriented I&W system, or feed information into long-range estimates of potential adversaries. ISR can provide both a "telescopic" view and a "microscopic" view of the battlespace.

Air, space-, ground-, and sea-based platforms and teams provide intelligence on opposing force orders of battle, disposition, capabilities, and events underway. All of these assets, working together, can help identify adversary centers of gravity and courses of action and improve the commander's overall awareness.

In addition to maintaining intelligence data bases for nodal analysis and assessing foreign capabilities, ISR resources can help provide strategic, operational, and tactical situation awareness essential for monitoring and assessing global, theater, and local conditions. Further, data fusion (a key aspect of intelligence analysis), assisted by technological advances in

An ISR Mosaic

computer capabilities, can provide immediate worldwide crisis support. **Intelligence collection and analysis must be conducted constantly keeping the capabilities and requirements of aerospace warfare in mind.** Furthermore, ISR support to aerospace operations not only provides the collection and analysis of information in traditional areas (such as orders of battle and warning), but also provides the kinds of information that allow intelligence analysts to accurately estimate probable adversary courses of action.

To this end, *intelligence preparation of the battlespace* is a continuous process conducted throughout the range of military operations to achieve and maintain superior situational awareness. IPB provides warfighters with a mission-focused and tailored understanding of an adversary and is the key to integrating *ISR operations.*

VISION FOR THE FUTURE

Aerospace force commanders should focus on aggressively seeking improvements to integrated ISR. From the airman's view:

- **The theaterwide aspect of aerial surveillance and reconnaissance calls for unity of command to gain the most efficient application of aerospace ISR assets.**

- The lessons of history (early WWII and entire Vietnam; see AFDD 1) demonstrate that "**attempts to fragment the control and planning of air and space power will ultimately cost blood and treasure by diverting effort and impact**" (AFDD 1). This holds true for all applications of aerospace power, including ISR.

- **Information Superiority is a core competency of the Air Force.** *A critical part of achieving the goal of Information Superiority comes from our ability to provide ISR products and information to the warfighters, the commanders, and the NCA.* "Today, **the Air Force is the major operator of sophisticated air- and space-based intelligence, surveillance, and reconnaissance systems and is the service most able to quickly respond to the information they provide**" (AFDD 1).

- **Strategy, planning, tasking, directing, and reporting is a command responsibility, not a functional staff duty since it requires force employment.**

- Mission tempo, diversity, and dynamics argue for centralized control.

- **The JFACC should be the ISR authority for the JFC. The JFACC is best suited to perform this role for the JFC due to the JFACC's unique command and control organization (the JAOC), the JFACC's theaterwide perspective, and the fact that the JFACC will typically bring the preponderance of ISR assets to the fight.**

At the very Heart of Warfare lies doctrine …

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GLOSSARY

Abbreviations and Acronyms

ABL	airborne laser
ACO	airspace control order
AFDD	Air Force Doctrine Document
AFFOR	Air Force forces
AIA	Air Intelligence Agency
AIG	air intelligence group
AIS	air intelligence squadron
AOB	air order of battle
AOC	air operations center
AOG	air operations group
AOR	area of responsibility
AOS	air operations squadron
ATO	air tasking order
AWACS	Airborne Warning and Control System
BDA	battle damage assessment
C2	command and control
C4	command, control, communications, and computers
C4I	command, control, communications, computers, and intelligence
CCIR	commander's critical intelligence requirement
CI	counterintelligence
CINC	commander of a combatant command; commander in chief
CMA	collection management authority
COMAFFOR	Commander, Air Force Forces
COMINT	communications intelligence
CONPLAN	concept plans
CSAR	combat search and rescue
DIA	Defense Intelligence Agency
DMOB	defensive missile order of battle
DOD	Department of Defense
DODIIS	Department of Defense Intelligence Information System
DSP	Defense Support Program

EEI	essential elements of information
ELINT	electronic intelligence
EOB	electronic order of battle
FISINT	foreign instrumentation signals intelligence
FOA	field operating agency
GCI	ground-controlled intercept
GMI	general military intelligence
GEODSS	ground-based electro-optical deep spacesurveillance
HUMINT	human resources intelligence
I&W	indications and warning
IMINT	imagery intelligence
IO	information operations
IPB	intelligence preparation of the battlespace
ISR	intelligence, surveillance, and reconnaissance
IW	information warfare
JAOC	joint air operations center
JFACC	joint force air component commander
JFC	joint force commander
JIC	Joint Intelligence Center
JSTARS	joint surveillance, target attack radar system
JTF	joint task force
MA	mission assessment
MAAP	master air attack plan
MAJCOM	major command
MASINT	measurement and signature intelligence
MEA	munitions effectiveness assessment
MILSTAR	military strategic and tactical relay system
MOOTW	military operations other than war
NAF	numbered air force
NCA	National Command Authorities
NIST	National Intelligence Support Team(s)
NRT	near-real-time
OB	order of battle
OPCON	operational control
OPLAN	operations plan
OSINT	open source intelligence

PIR	priority intelligence requirement
R&D	research and development
RDF	radio direction finding
RFI	request for information
RT	real-time
S&TI	scientific and technical intelligence
SA	situational awareness
SAM	surface-to-air missile
SAR	search and rescue
SEAD	suppression of enemy air defenses
SIGINT	signals intelligence
SIO	senior intelligence officer
SIOP	Single Integrated Operations Plan
SO	special operations
SOF	special operations forces
SOTA	SIGINT operational tasking authority
SPINS	special instructions
SR	special reconnaissance
SSN	space surveillance network
SSO	special security office
TACON	tactical control
TACS	theater air control system
TMDOB	theater missile defense order of battle
TTP	tactics, techniques, procedures
UAV	unmanned aerial vehicle
USCENTAF	US Central Command Air Forces
USCENTCOM	US Central Command
WMD	weapons of mass destruction

Definitions

administrative control. Direction or exercise of authority over subordinate or other organizations in respect to administration and support, including organization of Service forces, control of resources and equipment, personnel management, unit logistics, individual and unit training, readiness, mobilization, demobilization, discipline, and other matters not included in the operational missions of the subordinate or other organizations. Also called **ADCON**. (Joint Pub 1–02)

air operations center. The principal air operations installation from which aircraft and air warning functions of combat air operations are directed, controlled, and executed. It is the senior agency of the Air Force Component Commander from which command and control of air operations are coordinated with other components and Services. Also called **AOC**. (Joint Pub 1–02)

air tasking order. A method used to task and disseminate to components, subordinate units, and command and control agencies projected sorties/capabilities/forces to targets and specific missions. Normally provides specific instructions to include call signs, targets, controlling agencies, etc., as well as general instructions. Also called **ATO**. (Joint Pub 1–02)

battle damage assessment. The timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called **BDA**. (Joint Pub 1–02)

battlespace. The commander's conceptual view of the area and factors which he must understand to successfully apply combat power, protect the force, and complete the mission. It encompasses all applicable aspects of air, sea, space, and land operations that the commander must consider in planning and executing military operations. The battlespace dimensions can change over time as the mission expands or contracts according to operational objectives and force composition. Battlespace provides the commander a mental forum for analyzing and selecting courses of action for employing military forces in relationship to time, tempo, and depth. (Air Force term as applied to the scope of this AFDD) (AFDD 1)

collection. Acquisition of information and the provision of this information to processing and/or production elements. See **intelligence cycle**, subpart b. (Joint Pub 1–02)

collection management. The process of converting intelligence requirements into collection requirements, establishing priorities, tasking or co-

ordinating with appropriate collection sources or agencies, monitoring results and retasking, as required. (Joint Pub 1–02)

collection operations management. The authoritative direction, scheduling, and control of specific collection operations and associated processing, exploitation, and reporting resources. Also called **COM**. (Joint Pub 1–02)

collection plan. A plan for collecting information from all available sources to meet intelligence requirements and for transforming those requirements into orders and requests to appropriate agencies. (Joint Pub 1–02)

collection requirement. An established intelligence need considered in the allocation of intelligence resources to fulfill the essential elements of information and other intelligence needs of a commander. (Joint Pub 1–02)

collection requirements management. The authoritative development and control of collection, processing, exploitation, and/or reporting requirements that normally result in either the direct tasking of assets over which the collection manager has authority, or the generation of single-discipline tasking requests to collection management authorities at a higher, lower, or lateral echelon to accomplish the collection mission. Also called **CRM**. (Joint Pub 1–02)

combatant command (command authority). The nontransferable command authority established by Title 10 ("Armed Forces"), USC, Section 164, exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or SECDEF. Combatant command (command authority) cannot be delegated and is the authority of a combatant commander to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training, and logistics necessary to accomplish the missions assigned to the command. Combatant command (command authority) should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint commanders and Service and /or functional component commanders. Combatant command (command authority) provides full authority to organize and employ commands and forces as the combatant commander considers necessary to accomplish assigned missions. Operational control is inherent in combatant command. Also called **COCOM**. (Joint Pub 1–02)

combat search and rescue. A specific task performed by rescue forces to effect the recovery of distressed personnel during war or military operations other than war. Also called **CSAR**. (Joint Pub 1–02)

command and control. The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. Also called **C2**. (Joint Pub 1–02)

deception. Those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence to induce him to react in a manner prejudicial to his interests. (Joint Pub 1–02)

electronic intelligence. Technical and geolocation intelligence derived from foreign non-communications electromagnetic radiations emanating from other than nuclear detonations or radioactive sources. Also called **ELINT**. (Joint Pub 1–02)

electro-optics. The technology associated with those components, devices and systems which are designed to interact between the electromagnetic (optical) and the electric (electronic) state. (Joint Pub 1–02)

essential elements of information. The critical items of information regarding the enemy and the environment needed by the commander by a particular time to relate with other available information and intelligence in order to assist in reaching a logical decision. Also called **EEI**. (Joint Pub 1–02)

human resources intelligence. The intelligence information derived from the intelligence collection discipline that uses human beings as both sources and collectors, and where the human being is the primary collection instrument. Also called **HUMINT**. (Joint Pub 1–02)

imagery. Collectively, the representations of objects reproduced electronically or by optical means on film, electronic display devices, or other media. (Joint Pub 1–02)

indications and warning. Those intelligence activities intended to detect and report time-sensitive intelligence information on foreign devel-

opments that could involve a threat to the United States or allied military, political, or economic interests or to US citizens abroad. It includes forewarning of enemy actions or intentions; the imminence of hostilities; insurgency; nuclear/non-nuclear attack on the United States, its overseas forces, or allied nations; hostile reactions to the United States reconnaissance activities; terrorists' attacks; and other similar events. Also called **I&W**. (Joint Pub 1–02)

information. 1. Facts, data, or instructions in any medium or form. 2. The meaning that a human assigns to data by means of the known conventions used in their representation. (Joint Pub 1–02)

information assurance. Information operations that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation. This includes providing for restoration of information systems by incorporating protection, detection, and reaction capabilities. (DODD S–3600.1)

information attack. An activity taken to manipulate or destroy an adversary's information systems without visibly changing the physical entity within which it resides. (Air Force term as applied to the scope of this AFDD.)

information-in-warfare. Involves the Air Force's extensive capabilities to provide global awareness throughout the range of military operations based on integrated intelligence, surveillance, and reconnaissance (ISR) assets; information collection/dissemination activities; and its global navigation and positioning, weather, and communications capabilities. Also called **IIW**. (Air Force term as applied to the scope of this AFDD.)

information operations. Actions taken to affect adversary information and information systems while defending one's own information and information systems. Also called **IO**. (DODD S–3600.1) The Air Force believes that in practice a more useful working definition is: *[Those actions taken to gain, exploit, defend or attack information and information systems. This includes both information-in-warfare (IIW) and information warfare (IW).](AFDD 1)* {Italicized definition in brackets applies only to the Air Force and is offered for clarity.}

information requirements. Those items of information regarding the enemy and his environment which need to be collected and processed in order to meet the intelligence requirements of a commander. (Joint Pub 1–02)

information superiority. That degree of dominance in the information domain which permits the conduct of operations without effective opposition. Also called **IS**. (*Joint Pub 1–02*) The Air Force prefers to cast 'superiority' as a state of relative advantage, not a capability, and views IS as: *[That degree of dominance in the information domain which allows friendly forces the ability to collect, control, exploit, and defend information without effective opposition.]* (AFDD 2) {Italicized definition in brackets applies only to the Air Force and is offered for clarity.}

information system. The organized collection, processing, transmission, and dissemination of information, in accordance with defined procedures, whether automated or manual. In information warfare, this includes the entire infrastructure, organization, and components that collect, process, store, transmit, display, disseminate, and act on information. (Joint Pub 1–02)

information warfare. Actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems, and computer-based networks while leveraging and defending one's own information, information-based processes, information systems, and computer-based networks. Also called **IW**. (Joint Pub 1–02) *[Information operations conducted to defend one's own information and information systems, or to attack and affect an adversary's information and information systems.]* {Italicized definition in brackets applies only to the Air Force and is offered for clarity.}

infrared imagery. That imagery produced as a result of sensing electromagnetic radiations emitted or reflected from a given target surface in the infrared position of the electromagnetic spectrum (approximately 0.72 to 1,000 microns). (Joint Pub 1–02)

intelligence. 1. The product resulting from the collection, processing, integration, analysis, evaluation, and interpretation of available information concerning foreign countries or areas. 2. Information and knowledge about an adversary obtained through observation, investigation, analysis, or understanding. (Joint Pub 1–02)

intelligence collection plan. A plan for gathering information from all available sources to meet an intelligence requirement. Specifically, a logical plan for transforming the essential elements of information into orders or requests to sources within a required time limit. (Joint Pub 1–02)

intelligence cycle. The steps by which information is converted into intelligence and made available to users. There are five steps in the cycle: **a. planning and direction**—Determination of intelligence requirements, preparation of a collection plan, issuance of orders and requests to information collection agencies, and a continuous check on the productivity of collection agencies. **b. collection**—Acquisition of information and the provision of this information to processing and/or production elements. **c. processing**—Conversion of collected information into a form suitable to the production of intelligence. **d. production**—Conversion of information into intelligence through the integration, analysis, evaluation, and interpretation of all source data and the preparation of intelligence products in support of known or anticipated user requirements. **e. dissemination**—Conveyance of intelligence to users in a suitable form. (Joint Pub 1–02)

intelligence preparation of the battlespace. An analytical methodology employed to reduce uncertainties concerning the enemy, environment, and terrain for all types of operations. Intelligence preparation of the battlespace builds an extensive data base for each potential area in which a unit may be required to operate. The data base is then analyzed in detail to determine the impact of the enemy, environment, and terrain on operations and presents it in graphic form. Intelligence preparation of the battlespace is a continuing process. Also called **IPB**. (Joint Pub 1–02)

intelligence requirement. Any subject, general or specific, upon which there is a need for the collection of information, or the production of intelligence. (Joint Pub 1–02)

intelligence, surveillance, and reconnaissance. Integrated capabilities to collect, process, exploit and disseminate accurate and timely information that provides the battlespace awareness necessary to successfully plan and conduct operations. Also called **ISR**. (Air Force term as applied to the scope of this AFDD)

interoperability. 1. The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. (Joint Pub 1–02)

interpretation. A stage in the intelligence cycle in which the significance of information is judged in relation to the current body of knowledge. (Joint Pub 1–02)

joint force. A general term applied to a force composed of significant elements, assigned or attached, of two or more Military Departments, operating under a single joint force commander. See also **joint force commander**. (Joint Pub 1–02)

joint force air component commander. The joint force air component commander derives authority from the joint force commander who has the authority to exercise operational control, assign missions, direct coordination among subordinate commanders, redirect and organize forces to ensure unity of effort in the accomplishment of the overall mission. The joint force commander will normally designate a joint force air component commander. The joint force air component commander's responsibilities will be assigned by the joint force commander (normally these would include, but not be limited to, planning, coordination, allocation, and tasking based on the joint force commander's apportionment decision). Using the joint force commander's guidance and authority, and in coordination with other Service component commanders and other assigned or supporting commanders, the joint force air component commander will recommend to the joint force commander apportionment of air sorties to various missions or geographic areas. Also called **JFACC**. See also **joint force commander**. (Joint Pub 1–02)

joint force commander. A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called **JFC**. See also **joint force**. (Joint Pub 1–02)

joint task force. A joint force that is constituted and so designated by the Secretary of Defense, a combatant commander, a subunified commander, or an existing joint task force commander. Also called **JTF**. (Joint Pub 1–02)

measurement and signature intelligence. Scientific and technical intelligence obtained by quantitative and qualitative analysis of data (metric, angle, spatial, wavelength, time dependence, modulation, plasma, and hydromagnetic) derived from specific technical sensors for the purpose of identifying any distinctive features associated with the target. The detected feature may either be reflected or emitted. Also called **MASINT**. (Joint Pub 1–02)

military operations other than war. Operations that encompass the use of military capabilities across the range of military operations short of

war. These military actions can be applied to complement any combination of the other instruments of national power and occur before, during, and after war. Also called **MOOTW**. (Joint Pub 1–02) *[An umbrella term encompassing a variety of military operations conducted by the Department of Defense that normally complement the other instruments of national power. These military operations are as diverse as providing support and assistance (when consistent with US law) in a nonthreatening environment, and conducting combat not associated with war.]* (AFDD 2–3) {Italicized definition in brackets applies only to the Air Force and is offered for clarity.}

monitoring. 2. The act of listening, carrying out surveillance on, and/or recording of enemy emissions for intelligence purposes. (Joint Pub 1–02)

National Command Authorities. The President and the Secretary of Defense or their duly deputized alternates or successors. Also called **NCA**. (Joint Pub 1–02)

near real time. Pertaining to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing. This implies that there are no significant delays. Also called **NRT**. (Joint Pub 1–02)

operational control. Transferable command authority that may be exercised by commanders at any echelon at or below the level of combatant command. Operational control is inherent in combatant command (command authority). Operational control may be delegated and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission. Operational control includes authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command. Operational control should be exercised through the commanders of subordinate organizations. Normally this authority is exercised through subordinate joint force commanders and Service and/or functional component commanders. Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions. Operational control does not, in and of itself, include authoritative direction for logistics or matters of administration, discipline, internal organization, or unit training. Also called **OPCON**. (Joint Pub 1–02)

radar imagery. Imagery produced by recording radar waves reflected from a given target surface. (Joint Pub 1–02)

reachback. The ability of a deployed unit or commander to rapidly obtain additional forces, equipment, or materiel from out-of-theater sources. Reachback substitutes communications and asset visibility information for forces and inventory, utilizing a network that provides identical real-time weapon system status and requirement information to in-theater units, theater logistics managers, and continental United States (CONUS) resupply activities. (Air Force term as applied to the scope of this AFDD) [ISR's ability to satisfy the deployed commander's need for rapid response to requests involving air-related intelligence from out-of-theater support. For example, theater Joint Intelligence Centers (JICs) provide core intelligence, including general military intelligence (GMI) products, installation data, and orders of battle. When Air Force units require support not available from the theater, for example, weapon system-unique target materials, they may rely on the reachback concept.]

real time. Pertaining to the timeliness of data or information which has been delayed only by the time required for electronic communication. This implies that there are no noticeable delays. (Joint Pub 1–02)

reconnaissance. A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. (Joint Pub 1–02) [*A transitory mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an adversary or potential adversary, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area.*] {Italicized definition in brackets applies only to the Air Force and is offered for clarity.}

sensor. An equipment which detects, and may indicate, and/or record objects and activities by means of energy or particles emitted, reflected, or modified by objects. (Joint Pub 1–02)

signals intelligence. 1. A category of intelligence comprising either individually or in combination all communications intelligence, electronic intelligence, and foreign instrumentation signals intelligence, however transmitted. 2. Intelligence derived from communications, electronics, and foreign instrumentation signals. Also called **SIGINT**. (Joint Pub 1–02)

special operations. Operations conducted by specially organized, trained, and equipped military and paramilitary forces to achieve military, political, economic, or psychological objectives by unconventional military means in hostile, denied, or politically sensitive areas. These operations are conducted during peacetime competition, conflict, and war, independently or in coordination with operations of conventional, nonspecial operations forces. Political-military considerations frequently shape special operations, requiring clandestine, covert, or low visibility techniques, and oversight at the national level. Special operations differ from conventional operations in degree of physical and political risk, operational techniques, mode of employment, independence from friendly support, and dependence on detailed operational intelligence and indigenous assets. Also called **SO**. (Air Force term as applied to the scope of this AFDD)

special reconnaissance. Surveillance and reconnaissance actions conducted by special operations forces to obtain or verify, by visual observation or other collection methods, information concerning the capabilities, intentions, and activities of an actual or potential enemy or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. It includes target acquisition, area assessment, and post-strike reconnaissance. Also called **SR**. (Joint Pub 1–02)

suppression of enemy air defenses. That activity which neutralizes, destroys or temporarily degrades surface-based enemy air defenses by destructive and/or disruptive means. Also called **SEAD**. (Air Force term as applied to the scope of this AFDD)

surveillance. The systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means. (Joint Pub 1–02)

tactical control. Command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. Tactical control is inherent in operational control. Tactical control may be delegated to, and exercised at any level at or below the level of combatant command. Also called **TACON**. (Joint Pub 1–02)

target. 1. A geographical area, complex, or installation planned for capture or destruction by military forces. 2. In intelligence usage, a country, area, installation, agency, or person against which intelligence operations are directed. (Joint Pub 1–02)

target acquisition. The detection, identification, and location of a target in sufficient detail to permit the effective employment of weapons. (Joint Pub 1–02)

targeting. The process of selecting targets and matching the appropriate response to them, taking account of operational requirements and capabilities. (Joint Pub 1–02)

unmanned aerial vehicle. A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload. Ballistic or semiballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles. Also called **UAV**. (Joint Pub 1–02)